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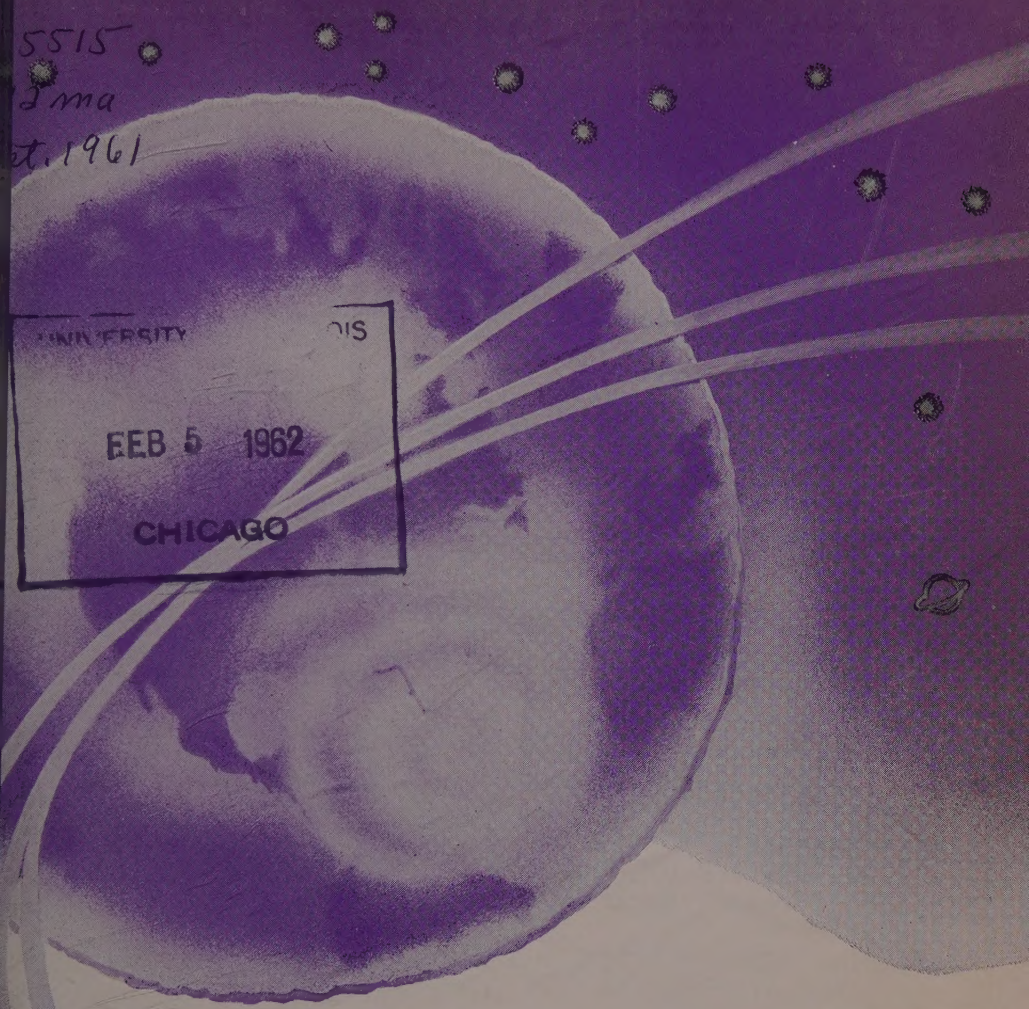

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Vol. 12 SEPTEMBER 1961 NO. 9

METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS

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METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS

MALCOLM RIGBY, Editor

Vol. 12 September 1961 No. 9

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METEOROLOGICAL
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1919

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Special Feature in This Issue

Annotated Bibliography on Planetary Atmospheres
I. Planets in General and the Earth

By

Andrew Meglis and Geza Thuronyi

(For complete table of contents see back cover)

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METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS

FOREWORD

Meteorological and Geoastrophysical Abstracts is a monthly publication devoted to current literature in meteorology, geophysics and astrophysics.

Part I contains abstracts of current literature in the fields of meteorology, etc.

Part II of each issue comprises an annotated bibliography of important references on a special subject. Bibliographies published in the successive issues were:

Vol. I, 1950

1. Atmos. Pollution 2. Aerobiology 3. Cloud Physics 4. Hail
5. Tornadoes 6. Volcanic Dust 7. Climat. Changes 8. Thunderstorms
9. Icing 10. Acoust. Propagation 11. Evaporation

Vol. II, 1951

1. Extended Forecast. 2. Long Range Forecast. 3. Soil Temp. 4. Constants, etc.
5. Clim. of Near East 6. Clim. of Middle East 7. Special Winds 8. Radar Storm
9. Condensation Trails 10. Clim. of N. E. Africa 11. Mountain Met. Detect.

Vol. III, 1952

1. Clim. of N. W. Africa 2. Carbon Dioxide 3. Clim. of Argentina, etc. 4. Dew
5. Objective Forecast. 6. Stratus Forecast. 7. Urban Climatology 8. Clim. of C. Africa
9. Visibility 10. Glaze and Rime 11. Free Air Turbulence

Vol. IV, 1953

1. Turbulence Theory 2. Turbulent Diffusion 3. Frost 4. Clim. of Australia, etc.
5. High Level Winds 6. Winds in Stratosphere 7. Jet Stream 8. Radiation Bioclim.
9. Clim. of Pacific 10. Auroras 11. Sferics

Vol. V. 1954

1. Oceanog. Met. 2. Clim. of S. E. Asia 3. Auroral Physics 4. Tropopause
5. Balloons 6. Numerical Forecast. 7. Radiation Data 8. Vertical Motion
9. Clim. of Arctic 10. Industrial Met. 11. Wind Waves and Swell

Vol. VI, 1955

1. Bibliog. of Bibliog. 2. Texts & Monogr. Bibliogs. 3. Storm Surges
4. Ionospheric Prop. 5. Photochem.—Upper Atmos. 6. Cloud Physics
7. Radar Cloud Physics 8–9. Atmos. Nuclei 10. Weather Modification 11. Cooling Power

Vol. VII, 1956

1. Synoptic Met.-Arctic 2. Clim. of Enclosed Spaces 3. Cosmic Rays (–1952)
4. Cosmic Rays (1953–56) 5. Atmos. Radioactivity 6. Inversions
7. Snow Micromet. 8. Snow Micromet. (Suppl.) 9–11. Tropical Cyclones

Vol. VIII, 1957

1. Solar Weather Relations 2. Night Airglow 3. Forecasting Special Elements
4. Forest Micrometeorology 5. Hydromet. Forecasting 6. Numerical Forecast. (Suppl.)
7. Albedo 8. Meteors 9–10. Tropospheric Prop. 11. Medical Meteorology

Vol. IX, 1958

1. Radioastronomy 2. Solar Astrophysics 3. Radioactivity in Atmosphere
4. Waves and Currents 5. Physical Oceanog. 6. Dynamic & Phys. Oceanog.
7. Long Range Forecast. 8. Radar Met. 9. Cosmic Rays 10–11. Geomagnetism

Vol. X, 1959

1. Works of C. E. P. Brooks 2. Tornado Forecasting 3. Soil Moisture 4. Sferics
5–6. Ozone 7. Acoustic Waves 8. Evaporation Measurement
9. Evapotranspiration (–1955) 10. Evapotranspiration (1956–1959) 11. Evaporation

Vol. XI, 1960

1. Outstanding Reference Works 2. Outstanding Texts 3. Numerical Forecast. (Suppl.)
4. Ionospheric Physics 5. Ionospheric Propagation 6. Ionosphere
7. Forecast Verification 8. Radar Meteorology 9. Rocket Meteorology
10. Satellite Meteorology 11. Airglow

Bibliographies in preparation or published in Vol. XII

1. *Aurora* 4–6. *Upper Atmos. Structure* 9. *Planetary Atmospheres: General*
2. *Auroral Physics* 7. *Precipitation Chemistry* 10. *Planet. Atmos.: Mars, Venus & Saturn*
3. *Limnology* 8. *Upper Atmos. Humidity* 11. *Jovian Planets and Moon*

Part III contains a listing of translations and the contents of important publications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DNLM:	U. S. National Library of Medicine, Washington, D. C.
DP:	U. S. Patent Office Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts.

Geographic locations are in the English form rather than the form used locally, for example, Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet using a modification of the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (Vol. 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL AND GEOASTROPHYSICAL MATERIAL

A. GENERAL

A1. COLLECTED WORKS

12.9–1 551.515:551.461.2:551.556.8(05)

§*Netherlands. Meteorologisch Instituut, **Meteorologische en oceanografische aspecten van stormvloeden op de Nederlandse Kust.** [Meteorological and oceanographic aspects of storm surges on the Netherlands Coast.] The Hague, Netherlands, 1960. 200 p. numerous figs., numerous tables, refs. at end of each chapter, numerous eqs. In Dutch; English and French summaries at beginning of each chapter. "This is a preliminary publication of the Delta Committee. This publication, which will appear in the report of the Delta Committee as Contribution 1, deals particularly with meteorological and oceanographic aspects." **DWB**—This book presents 13 papers dealing with the meteorological and oceanographic aspects of storm surges on the Netherlands Coast. The papers are arranged in three sections. The first section contains two papers which concern the gale of Feb. 1, 1953. The first paper gives an analysis of the meteorological and synoptic aspects of the gale and the second outlines the analysis of the observed water heights. Seven papers are given in the second section which discuss the meteorological and statistical features of the severe gales. Section three consists of four articles which deal with the wind effects on sea levels along the Netherlands Coast. All the papers are extensively illustrated by synoptic charts, recorder records, graphs, trajectory charts, tables, etc. *Subject Headings:* **1. Storm surges 2. Wind effects on sea levels 3. Meteorological monographs 4. Netherlands.**—*I.S.*

12.9–2 551.510.535(08)

Japan. Science Council. Ionosphere Research Committee, **Symposium on the movement of the non-uniform ionized gas in the magnetic field, Dec. 19, 1958.** Entire issue of its *Report of Ionosphere and Space Research in Japan* (formerly entitled *Report of Ionosphere Research in Japan*), Vol. 13, No. 1, 1959. 90 p. (For listing of articles of this Symposium (abstracted separately), *see* 11(7):1180, July 1960, *Met. Abs.*) Also: Maeda, Ken-ichi (*Dept. of Electronics, Kyoto Univ.*), **Opening discussion,** p. 1–3. **DWB, DLC**—The Ionosphere Research Committee held a symposium on 19 Dec. 1958 on the movement of non-uniform ionized gas in the magnetic field. Papers on both the theoretical treatments and experimental studies were presented and they are summarized in this issue. The opening discussion was presented by KEN-ICHI MAEDA who referred to the complexities of the dynamo theory, the theory of atmospheric resonance oscillation, theory of irregularity movement and the radio and rocket methods of observation. *Subject Headings:* **1. Ionospheric symposia 2. Ionized gas in a magnetic field 3. Atmosphere dynamo theory.**—*E.Z.S.*

12.9–3 551.501.7(08):551.5:551.58

Symposium on Weather Reconnaissance System User's Requirements, Univ. of Michigan, Nov. 12–14, 1958, **Proceedings of First Symposium.** (Held under the joint sponsorship of the Bendix Systems Div. and the Meteorological Laboratory of the Univ. of Michigan.) Issued Ann Arbor, Michigan, Bendix Aviation Corporation, (1959). Each section repaged. figs., tables, 13 refs. Contents: **Introduction,** Section 1 (17 p.). Willett, H. C., **Sub-Seminar on data access and climatology,** Sec. 2 (22 p.). Neuberger, H. H., **Physics of the atmosphere,** Sec. 3 (17 p.). Weickmann, H. K., **New parameters,** Sec. 4 (17 p.). Magilavy, D., **Historical review of air weather reconnaissance,** Appendix B (12 p.). **DWB** (M(051) S989pr)—The present and foreseeable needs and uses of climatology and research for AMQ-15 data are highlighted in this report as discussed in the sub-seminar on meteorological data access during this

Symposium. Meteorological analysis and prognosis as well as the physics of the atmosphere and the provision of new parameters, are discussed too; based on the maximum amount of expert information pertinent to the AN/AMQ-15 system. *Subject Headings:* **1. Weather reconnaissance system symposia 2. Air weather reconnaissance 3. Climatology.**—*N.N.*

12.9–4 550.3(08)

International Union of Geodesy and Geophysics, 12th, Helsinki, July 25–Aug. 6, 1960, **Reports [based on material prepared by various members of the National Academy of Sciences—American Geophysical Union Delegation to the 12th General Assembly of the IUGG, supplemented by unedited drafts of IUGG and Association documents.** Not to be considered an official IUGG account]. *American Geophysical Union, Transactions*, 41(4):541–658, Dec. **1960.** Presents, in addition to Administrative report, the General Report, Sessional Meetings, and Symposia for each section, Seismology and Physics of the Interior; Meteorology and Atmospheric Physics; Geomagnetism and Aeronomy; Copenhagen Symposium on Aeronomy; Physical Oceanography; Volcanology; Scientific Hydrology. **DWB, DLC**—A report of the Twelfth General Assembly of the International Union of Geodesy and Geophysics held at the University of Helsinki from July 25 to Aug. 6, 1960. It lists the principal delegates and gives a detailed account of the proceedings of each association following the presentation of the general and administrative reports. The Presidential address is included. It contains brief abstracts of the papers presented in each of the meetings. The principal delegates to the Associations were: Geodesy, CHARLES PIERCE; Seismology and Physics of the Earth's Interior, LEONARD M. MURPHY; Meteorology, THOMAS F. MALONE; Geomagnetism and Aeronomy, LEROY R. ALLDREDGE; Oceanography, WALTER H. MUNK; Volcanology, J. FRANK SCHAIRER; Hydrology, WALTER B. LANGBEIN. *Subject Headings:* **1. Geophysics symposia 2. International Union of Geodesy and Geophysics. I. American Geophysical Union II. National Academy of Science.**—*E.Z.S.*

12.9–5 551.46:355

Woods Hole Oceanographic Institution, Woods Hole, Mass., **Environmental factors influencing the performance of naval weapon systems.** Woods, Hole, **1959.** 131 p. figs., refs., eqs. "Pt. 1 of a series of lectures given at Woods Hole Oceanographic Institution." Pertinent articles (abstracted separately) are: Iselin, Columbus O'D., **Introduction,** p. 1–8. Iselin, Columbus O'D., **The basic thermal structure of the oceans,** p. 9–22. Richardson, William S., **Details of ocean structure,** p. 23–28. Hersey, J. B., **Bottom topography and sediments,** p. 29–44. Chase, Joseph, **Oceanic climatology—North Atlantic,** p. 45–52. Bunker, Andrew F., **Marine meteorology,** p. 53–61. Blanchard, Duncan C., **The production of bubbles near the surface of the sea and their influence on the aerosol distribution and space charge of the atmosphere,** p. 63–73. Blanchard, Duncan C. and Woodcock, A. H., **Bubble formation and modification in the sea and its meteorological significance,** 13 p. reprint from Tellus, 9(2), May 1957 following p. 73. Graham, John W., **Gravity anomalies and magnetics,** p. 75–84. Hays, Earl, **Underwater sound,** p. 85–95. Farmer, Harlow G., **Oceanographic factors affecting amphibious warfare,** p. 97–114. Lyon, Waldo, **Arctic problems,** p. 115–124. Hovorka, John, **Inertial navigation,** p. 125–131. **DWB** (M:623.4 W894en)—This publication represents Part I of a series of lectures given at the Woods Hole Oceanographic Institution for representatives of industry. The 12 papers contained in this volume describe the fundamentals of oceanography and the relationship of these environmental factors to naval warfare. All the papers are extensively illustrated by graphical representations. *Subject Headings:* **1. Oceanographic research reports 2. Naval weapon systems 3. Oceanography reprint collections.**—*I.S.*

A2. TEXTBOOKS

12.9–6 91(85)(02) 551.582(85)

†Schweigger, Erwin, **Die Westküste Südamerikas im Bereich des Peru-Stroms.** [The west coast of South America in the vicinity of the Peru Current.] Heidelberg, Keysersche Verlagsbuchhandlung, **1959.** 513 p. 23 charts (4 fold. in pocket), 24 photos, tables, 240 refs. **(Geographische Handbücher,** ed. by Hermann Lautensach.) **DWB** (M82/8 S413we)—A detailed geographic study of the west coast of South America in the vicinity of the Peru current

encompassing studies of the coast, the near shore bottom topographic features, the distribution of living forms with emphasis on animal provinces—the guano deposits and the guano depositing birds. The climate of this coastal region is described on the basis of data collected between 1948 and 1955. Data on air pressure, temp. of land and sea, precip. and clouds are given in tables. Photographs are included showing various coastal features and the areas of bird habitations. *Subject Headings:* **1. Geography textbooks 2. Coastal geography 3. West Coast, So. America.**—*E.Z.S.*

12.9–7 551.311.2/3:551.1(02) 551.588

†Wilhelmy, Herbert (*Prof. Geography, Technische Hochschule, Stuttgart*), **Klimamorphologie der Massengesteine.** [Climate morphology of massive rock formations.] Brunswick, Westermann Verlag, **1958.** 238 p. 137 figs., 385 refs. Price: DM 35.80. **DLC** (QE499.(5). Review by Axel Schou in *Geografisk Tidsskrift*, 59:287–288, 1960.—A detailed geomorphic study of the weathering of massive rocks under various climatic regimes. Exogenous and endogenous forces are considered. Microclimatic effects on various types of massive rocks are emphasized. Photographs of typical landscapes and boulder fields in widely separated areas of the world illustrate the text. *Subject Headings:* **1. Rock weathering 2. Climatic influences on rock weathering 3. Geomorphology textbooks.**—*E.Z.S.*

A3. BOOKS AND MONOGRAPHS

See also: **Coop. snow investo.-Fraser, Colo.** (Garstka *et al.*), 12.9–124.

12.9–8 711(02) 551.588:631.14(944)

Yeomans, P. A., **The challenge of landscape: the development and practice of Keyline.** Sydney, Australia, Keyline Pub. Pty. Ltd., **1958.** 271 p. 21 figs., 32 plates. **DLC** (S471.A82N48). Review in *Scottish Geographical Magazine, Edinburgh*, 75(3):185, Dec. 1959. **DWB**—The present book is a narrative of practical experiments and experiences connected with the Keyline plan, developed in New South Wales. The Plan consists of a comprehensive approach to the planned use of land, recommending, mainly, the improvement of the soil's climate against the background of the general climatic conditions which affect it and which have largely created the soil. Of 21 chapters of which the book is divided, the chapters of special interest for the meteorologists are the third and the fifth chapters. The third chapter discusses the influence of climate on the development of soil, and the fifth, the significance of climate in connection with the Keyline plan. The book is nicely illustrated by photographs. *Subject Headings:* **1. Land utilization 2. Climatic influences on soils 3. New South Wales, Australia.**—*I.S.*

12.9–9 550.3(023) 523.11

Bondi, Hermann, **The universe at large.** Garden City, N. Y., Doubleday & Co., **1960.** 154 p. 52 figs., 12 plates. (*Science Study Series*, No. S14.) Price: $.95. Vita p. 9–11. **DLC** This book appeared originally as a series of articles in the *Illustrated London News*. Although it is intended for the "young student and layman" it includes much of interest to scientists in other disciplines. Theories on the expanding universe, relativistic cosmology, and steady state cosmology are explained and a variety of tests of the acceptability of the theories are presented. Stars and space between the stars, earth's radiation belts, gravitation motion of celestial bodies, tides and final earth's motion and magnetism are discussed. *Subject Headings:* **1. Universe 2. Geophysics books 3. Popular science books.**—*E.Z.S.*

12.9–10 551.581(213):631.4(02)

†Tempany, Sir Harold Augustin (late *Agricultural Adviser to Sec. of State for the Colonies*) and Grist, D. H. (*formerly Agricultural Economist, Colonial Agricultural Service, Malaya*), **An introduction to tropical agriculture.** London, Longmans, Green, **1958.** 347 p. 6 figs., 22 photos., 211 refs. Review attached. Price 40 sh. Review by C. G. Feilberg in *Geografisk Tidsskrift*, Copenhagen, 59:264–265, 1960. **DLC** (SB111.T4)—The problems of agriculture in the tropical countries are dealt with. The book describes the climatic and soil conditions in these countries. The problems of soil conservation, fertilizers, irrigation and animal husbandry are also discussed. Chapter I deals with the climatic and vegetational factors. The places

where atmospheric humidities are high the temperature never rises as high as in places where humidity is lower. It also describes the effects of humidity, vegetation and wind on the tropical climate. *Subject Headings:* **1. Tropical agriculture 2. Tropical soils 3. Tropical climates 4. Agriculture textbooks.**—*A.H.K.*

12.9–11 551.508(02)

Mironov, K. A. and Shipetin, L. I., **Teplotekhnicheskie izmeritel'nye pribory: spravochnye materialy.** [Thermotechnical measuring instruments.] Moscow, Gosud. Nauchno-Tekhnich. Izdatvo Mashinostroitel'noĭ i Sudostroitel'noĭ Lit., **1954.** 497 p. numerous figs., tables, eqs., 21 refs. **DLC** (QC53.M68)—The details of scores of types of industrial thermometers (mercury, gas, manometric, electrical, thermocouples, radiation pyrometers, potentiometers, bridges), and pressure measuring devices which can be used for indirect temperature measurements (barometers, monometers, etc.) and fluidity measuring equipment (which also is an indirect measure of temperature), for gases and liquids used in the USSR are given in text, live drawings, etc. with many tables and nomograms giving performance, calibration or conversion data for specific types whose characteristics are listed or tabulated. Examples of calculations are also appended. Both low and high temperature equipment are treated. *Subject Headings:* **1. Thermotechnical instruments 2. Thermotechnical measurement**—*M.R.*

12.9–12 551.510.5(05) 551.524.4(266)

†Neiburger, Morris; Johnson, David S. and Chien, Chen-Wu, **Studies of the structure of the atmosphere over the Eastern Pacific Ocean in summer, Pt. 1, The inversion over the Eastern North Pacific Ocean.** *California. Univ., Publications in Meteorology,* 1(1):1–94, **1961.** 40 figs., 7 tables, 24 refs., map, eq. Price: $2.50.—A comprehensive monograph of studies of the inversion over the Eastern North Pacific Ocean. All the available data regarding the inversion are given in this report. Following an introductory review of previous work, the work of the Cruises of the Marine Life Research Program are described. Radiosonde observations off the coast of California and Baja, Calif., were made by the University of California, L. A. Dept. of Meteorology, from the motor vessel "Crest" operated by the University of California, Scripps Institution of Oceanography in 1949 and 1950. From Aug. 1951 to Sept. 1952 the Weather Bureau provided observers for further observations aboard the "Crest." Their cruises were chiefly off the coast of Baja, Calif. The second section of the report provides a summary of the inversion data and the topography of the inversion off California. Section 3 presents similar data for the tropical eastern part of the Pacific Ocean. The average characteristics of the inversion in summer using all available data for the atmosphere over the Eastern North Pacific Ocean and the coastal stations, are presented in the 4th section. The 5th section is devoted to a discussion of the processes by which the inversion is formed and maintained. The influence of the inversion on the weather is discussed in the concluding section. References are made to VON FICKER'S (1936) and other studies of the inversion over the Atlantic Ocean. Illustrative maps and charts are included. Tables of inversion data and the procedures used in reducing inversion heights to a common time are included in the appendices. It is suggested that the inversion in summer is subject to considerable variation, both from one two-week period to another and from time to time within each two-week cruise. However, the general picture of the inversion being lower near the coast and sloping upward to the west seemed to be confirmed by the cruises. Perhaps the most consistent and striking feature was the absence of the inversion in the vicinity of the tropical convergence zone as shown by the surface winds. *Subject Headings:* **1. Inversion climatology 2. Eastern North Pacific inversion 3. Subtropical marine inversion 4. Eastern North Pacific.**—*E.Z.S.*

A4. ATLASES—MANUALS—HANDBOOKS

See also: **Ice Atlas—N. American Arctic** (Swithinbank), 12.9–23; **Aerospace Dictionary** (Gaynor), 12.9–62; **Psychrometric tables** (Rojecki), 12.9–257.

12.9–13 551.58(02) 551.582.1(43) 634.9(02)

Geiger, R., **Klimakunde.** [Climatology.] (In: Muller, R. (*ed.*), **Grundlagen der Forstwirtschaft.** [Fundamentals of forestry.] Hanover, Verlag M. & H. Schaper, (**1959?**).

. 629–655. fig., 22 tables, 7 refs., eq.) **DWB** (M88.6 G312kl)—A manual of climatology which gives in summary form the characteristics of various areas in Germany. In addition to notes on new publications, it contains conversion tables for ready reference and sections which give details on climatic elements as: composition of air, radiation temp., humidity and precip., wind, optics and electricity, phenological tables, mountain climates, and some tabulated data on forest areas of the world. Numerous tables of monthly averages or means are given and in some cases the data includes an extended period of ten or more yrs. *Subject Headings:* **1. Climatology manuals 2. Climate of Germany 3. Forests of the world 4. Forestry handbooks.**—*E.Z.S.*

12.9–14 551.501.1(02)

U. S. Electronic Support System Project Office (433L), **Reference manual for climatic data computer tapes: a report of USAF Weather observing and Forecasting System, 433L.** Jointly sponsored program of the Federal Aviation Agency-Department of Defense and Dept. of Commerce. Sept. 1, **1959.** 3 sections separately paged. charts, forms, tables. **DWB** (M09.3 U582re)—A reference manual for climatic data computer tapes. Contains a section on surface and upper air data requirements, a brief history of the airways observations, and explanations of tape notation and standard tape form. Terminal, grid point, station aerological and historical synoptic data acquisition are discussed. One section contains a description of the codes used, both in the punched card and in the taped observations. It also contains a detailed account of observing practices for individual elements of the airways observation. Procedures for converting punch card codes into the standard tape form codes are described in full. Includes a map of stations for surface data collection. Appendix A contains the airway hourly surface data reference manual. Appendix B explains the Grid-Point Data Project and includes the reference manual. Appendix C contains Northern Hemisphere Station Aerological data. This document is a report on the data acquisition program. Though it is specifically designed for the needs of System 433L it contains valuable information for any meteorologist who may have occasion to use the 433L data or who is faced with data acquisition problems. *Subject Headings:* **1. Weather observing and forecasting system 433L 2. Airways observations 3. Climatic data reference manuals.**—*E.Z.S.*

12.9–15 551.509.1:551.501.3(02)

Great Britain. Meteorological Office, **Instructions for the preparation of weather maps with tables of the specifications and symbols.** 3d ed. London, Her Majesty's Stationery Office, **1959.** 52 p. 2 figs., 6 tables. (*M.O.* 515.) **DWB**—The second edition of this handy manual was issued in 1954 (*see* 6.5–65). The present edition contains amendments to include new codes approved by the WMO Executive Committee in 1958 (Geneva) as well as the 1953 (Geneva) and 1947 (Washington) amendments included in the second edition. The manual gives instructions, codes and specifications for decoding surface synoptic observations from land stations and from ships and for plotting these reports on weather maps. *Subject Headings:* **1. Synoptic codes and specifications 2. Weather map plotting instruction manuals.**—*M.R.*

12.9–16 551.506.3(433) 551.501.9:551.43

*Lamont, Johannes (*K. Sternwarte bei München*), **Beobachtungen des Meteorologischen Observatoriums auf dem Hohenpeissenberg von 1792–1850.** [Observations of the Hohenpeissenberg Meteorological Observatory, 1792–1850.] Munich, Hübschmann, **1851.** 787 p. mostly tables. (*Munich. Sternwarte, Annalen, Supplementband*, 1.) **DLC**—This work contains a history of the station, description of instruments and changes therein, calibration details and elaborate tables of thrice daily and monthly mean pressure, temperature, humidity, vapor pressure, cloud amount, wind direction and speed, weather, etc., data for 60 years (1792–1850) at the Hohenpeissenberg Observatory. Instruments were installed by J. J. Hemmer of the Mannheim Society (Societas Meteorologica Palatina) in 1780 and remained unchanged during the period, except for addition of hair hygrometer (1828), a psychrometer (1841) and new thermometer (1842). Observations were made at the parsonage of a monastery or church at 3000 (Paris) feet above sea level, and most of the readings were at 7 A.M., 2 and 9 P.M. *Subject Headings:* **1. Long period data records 2. Historical weather records 3. Hohen-**

peissenberg, Germany. I. Münich: Sternwarte II. Mannheim, Societas Meteorologica Palatina.—*M.R.*

A5. POPULAR BOOKS

12.9–17 525.3(023)

Hurley, Patrick M., **How old is the Earth?** Garden City, N. Y., Doubleday & Co., **1959.** 160 p. 27 figs., 6 tables, 8 plates, 4 refs. (*Science Study Series*, No.S5 .) Price: $.95. Vita p. 2–3. **DLC**—Although intended for the "young student and laymen" this book includes much of general interest to scientists in various disciplines. Explanations are given on the structure of the earth, radioactivity and radioactivity of the earth, methods of measurement of absolute geologic time, memorable dates in Earth's History and the origin of the elements of the earth. *Subject Headings:* **1. Earth's age 2. Earth's structure 3. Popular science books.** —*E.S.*

12.9–18 5(023) 91.04(09)(98)

Shipton, Eric Earle, **The true book about the North Pole.** Illustrated by David Cobb. London, Muller, **1957.** 144 p. illus. **DLC** (G614.S57)—A popular book on exploration of the Arctic from earliest times to Ross and Parry, John Franklin and the Great Search, Nansen and Fram and, finally, Peary's successful attempt at reaching the North Pole. *Subject Headings:* **1. Arctic exploration 2. Popular science books.**—*M.R.*

12.9–19 91(98)(023)

Smith, Frances C., **The world of the Arctic.** Philadelphia, Lippincott, **1960.** 126 p. 16 photos. **DLC** (G614.S6)—The earlier chapters of the book give an account of the geography of the Arctic. Modern times have seen a concentrated assault on the Arctic. During the Second World War air bases were developed by different nations in the Arctic circle. After the Second World War both the Soviet Union and the U. S. made intensive efforts to obtain weather data. The chapter on the Soviet Arctic describes the vast mineral wealth of that region. The latter chapters describe the Eskimo life in the area. Photographs are included showing the Eskimo life as well as the localities, mining centers, etc. in the Arctic circle. *Subject Headings:* **1. Geography books 2. Arctic geography.**—*A.H.K.*

12.9–20 91.04(98)(023)

Freuchen, Peter, **Adventures in the Arctic.** Edited by Dagmar Freuchen. New York, J. Messner, **1960.** 383 p. 11 photos. **DLC** (G743.F67)—A narrative account of personal experiences in the early part of this century during journeys to and in Hudson Bay, Melville Bay, in Thule, Greenland and other parts of the Arctic. The major interest of the book is centered on the daily hardships and social life of the party and their Eskimo companions. Occasional references are made to weather conditions which increased the difficulties of life and travel. *Subject Headings:* **1. Arctic life 2. Eskimo life 3. Thule, Greenland 4. Arctic.** —*E.Z.S.*

12.9–21 551.582.1(99) 551.46(99) 91(99)

*†Lebedev, Vladimir L'vovich, **Antarktika.** [The Antarctic.] Moscow, Gos. Izdat-vo Geog. Lit., **1957.** 191 p. figs., photos, tables, 73 refs. **DWB** (919.9 L442an), **DLC** (G860.L39)—This small book goes quite thoroughly into the physical characteristics of the Antarctic: 1) limits, 2) expeditions, 3) geology and geography, 4) ice on the continent, "cases" and ice budget, 5) sea ice and pack ice, 6) sea water, circulation and tides, 7) climate (general circulation, oceanic and continental climate, paleoclimates), 8) whaling, birds, and ocean flora and fauna; and, finally, notes on IGY. and a fairly good reference list and subject index. Charts of mean January, July and annual pressure data on days with fog during each month, at 8 stations, charts of prevailing winds and extreme maximum and minimum temperatures are included in chapter on climate, along with other data. *Subject Headings:* **1. Antarctic geography books 2. Antarctic climate 3. Antarctic oceanography 4. Antarctica.**—*M.R.*

12.9–22 551.506.5(99) 551.582.2(99)

Borchgrevink, Carsten Egeberg, **U iuzhnogo poliusa god 1900.** [To the South Pole in 1900.] Ed. by N. Ia. Bolotnikova. Moscow, Gos. Izd-vo Geogr. Lit-ry, **1958.** 325 p.

photos, ports, 25 refs. First ed., 1901, published in English under title: **First on the Antarctic Continent.** **DLC** (G850.1898.S77)—Translated from the Norwegian **Naermest Sydpolen Aaret 1900** by S. A. TARKKHANOVA, 1905. The author, a naturalist, was the first person to set foot on the Antarctic continent, and the first scientist to winter in the Antarctic. Climatic conditions at Cape Adair, March 1899–Feb. 1900, are summarized in Ch. 6 (p. 145–160) with special emphasis on pressure, temperature, wind direction, frequencies, and wind speed. *Subject Headings:* **1. Antarctic expeditions 2. Climate of Cape Adair, Antarctica 3. Antarctica.**—*M.R.*

A6. ARCTIC

See also: **N. Polar exploration** (Shipton), 12.9–18; **Arctic geography** (Smith), 12.9–19; **Arctic adventure** (Freuchen), 12.9–20; **U. S.-IGY Arctic program** (Reed), 12.9–35; **Swedish-Finnish-Swiss Northeast Land Exped.** (Liljequist), 12.9–38; **Polish Spitsbergen Exped.** (Niewodniczański) 12.9–39; **Meteorol. reconnaissance in European Arctic** (Teich), 12.9–70; **Exploring polar regions** (Galbas), 12.9–90; **German Spitzbergen Exped. 1959/60** (Büdel), 12.9–132; **Advance and retreat of West Spitsbergen glaciers** (Dineley, Waters), 12.9–136.

12.9–23 551.326.6/7:912(98)

Swithinbank, C. W. M. (*Scott Polar Res. Inst., Cambridge, England*), **An ice atlas of the North American Arctic.** *National Research Council, Wash., D. C., Publication* No. 598:22–28, Dec. **1958.** 5 figs., 9 refs. **DLC, DWB** (551.311 A675pr)—The paper reports an ice study, still in progress, being made by the Scott Polar Research Institution for the Science Research Board of Canada. In order to devise a reliable ice atlas of the North American Arctic it is investigating the particular significances of ice to shipping. The study is based on Armstrong's work who developed a system by which ship, shore and aerial ice observations could be brought together on maps and made readily accessible to the mariner. Hydro ice charts (Fig. 1) prepared by the Navy Hydrographic Office and log books of every ship which had visited the area since 1900 are drawn upon as source material. In practice the data are assembled in the form of ice concentration figures in the case of aerial observation, and of the effect of ice upon the speed of a vessel in the case of ship observation. A separate plotting sheet is used for each week for which ice information is available. This information then is used for the construction of a graphic ice summary for each month of the year. *Subject Headings:* **1. Ice atlas of North American Arctic 2. Arctic.**—*I.S.*

12.9–24 551.547.3:551.557:551.542.1:519.241.6(98)

Godson, Warren L. (*Met. Serv. of Canada, Toronto*) and MacFarlane, M. Aylmer (*McGill Univ.*), **Tropospheric geopotential and velocity variances over the Arctic.** *Tellus*, Stockholm, 12(3):259–265, Aug. **1960.** fig., 2 tables, 10 refs., 27 eqs. **DWB**—As an elaboration of recent studies by BUELI (1954, 1957) and JENKINSON (1936), the relation between the standard deviation of contour height and the vector standard deviation of geostrophic wind velocity is formulated, both for point values (variations in time) and for chart values (variations in space). The relation between wind and contour variances for a simple schematic contour pattern is examined, from the point of view of both space and time statistics. The relationship between the space variance of contour height (S^2) and the space variance of the geostrophic wind (σ^2) was evaluated over the Arctic (north of about 60°N) at the 500-mb level. A high degree of correlation was found to exist between these two quantities, although the form of the relationship (σ^2 proportional to S) did not agree with the results of previous studies (BUELL, JENKINSON, loc. cit.) of time variances. However, a reanalysis of such data for northern latitudes yielded results virtually identical with those of the present study. In both cases, the standard error of estimate was too large to enable one to calculate accurately the wind variance from the height variance for synoptic purposes, but the relationships do allow climatological estimates (seasonal, etc.) to be made of the mean kinetic energy and of the size and amplitude of the dominant wave systems. *Subject Headings:* **1. Synoptic analysis 2. Tropospheric geopotential 3. Upper air pressure variations 4. Upper air wind velocity 5. Arctic.**—*Authors' abstract.*

12.9–25 551.511:551.551.2:551.322:551.510.522(98)

Doronin, Iu. P., **Turbulentnyĭ teploobmen mezhdu ledianym pokrovom i atmosferoĭ.** [Turbulent heat exchange between an ice cover and the atmosphere.] *Leningrad. Arkticheskiĭ i Antarkticheskiĭ Nauchno-Issledovatel'skiĭ Institut, Trudy*, 226:19–29, **1959.** 5 figs., 2 tables, 8 refs. Transl. into English by Roy Flagg, issued by Amer. Meteorological Society under Contract AF 19(604)-6113, March **1960.** 15 p. complete.—It is demonstrated that sufficiently reliable data from the heat exchange between an ice cover and the atmosphere in the Arctic can be obtained with standard meteorological observations using equations. Based on the theory that the distribution of meteorological elements near the underlying surface is caused by turbulent exchange between the atmosphere and the underlying surface; therefore, the heat and moisture exchange between ice and air can be evaluated from the vertical distribution of meteorological elements near the ice surface, and features of the temperature and humidity regime in the atmospheric boundary sublayer are surveyed. Basic laws make it possible to determine the turbulent heat and moisture fluxes between the underlying surface and the atmosphere from the vertical wind, and temperature and humidity distribution in the surface sublayer. The height at which the change of air temperature is proportional to the logarithm of the height averages 50–100 m. The wind velocity does not exert visible action on the value of height. The stratification of the atmosphere within the limits of the boundary sublayer in the summer period is characterized by a decrease of temperature with height; being an inversion in the winter. A positive radiation balance is observed chiefly for continuous cloudiness and inversion conditions. The moisture content of the air and the humidity gradients correspond chiefly to the distribution of temperature and temperature gradients. The mathematical derivation of turbulent heat and moisture fluxes between an ice cover and the atmosphere is started with the assumption that the vertical profile of the substance in the sublayer can be taken as logarithmic; the heat and moisture fluxes in thermal units were obtained. Turbulent heat fluxes are directed chiefly from ice to air in summer, from air to ice in winter, in accordance with the nature of temperature gradients. Changes of heat and moisture fluxes from the end of July to the end of August confirm the effect of the radiation factor on temperature change of the underlying surface and on the gradients and the heat and moisture fluxes. An efflux of heat and moisture from the underlying surface corresponds to a positive radiation balance; an influx of heat to the underlying surface to a negative one. Starting with the familiar formula connecting the specific humidity and vapor tension and assuming the relative humidity and atmospheric pressure relation as constant, the derived value of evaporation will agree with the observed values. During the transition from summer to winter the radiation balance becomes negative and the sign of the heat and moisture fluxes changes. The turbulent heat flux directed toward the underlying surface moisture condensation predominates instead of evaporation. Lacking gradient observations for the Arctic, and starting from standard meteorological observations, it is practical to determine the values of turbulent fluxes. Finally, the initial temperature distribution and the value of the heat and moisture flux in thermal units at 0°C temperature were derived. 41 atmospheric soundings of Aug. 1956 served to check the equation expressing the value. The value of the turbulent heat flux in Aug.: 230 cal/cm², as calculated from the 41 observations, was quite close to the value of the mathematically obtained formula. The figures show various temperature gradients while the tables present data on losses of heat to evaporation. *Subject Headings:* **1. Turbulent heat exchange 2. Heat transfer through ice 3. Arctic.**—*O.T.*

12.9–26 551.501.721:551.521.14(98)

†Gavrilova, M. K., **Radiatsionnyi balans Arktiki.** [Radiation balance of the Arctic.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 92:3–26, **1959.** 19 figs., 4 tables, 69 refs., 2 eqs. Russian summary p. 3. **DWB**—The history of studies on the radiation regime of the Arctic is reviewed on the basis of a survey of Soviet and foreign literature. The method for computing radiation absorption, effective radiation and radiation balance and for constructing maps showing the distribution of these elements in the Arctic region is presented. This method involves the use of the radiation balance equation $R=(Q+q_n)(1-A)-E_n$ where $(Q+q_n)$ = total radiation under actual conditions, A = albedo of the underlying surface and E_n = effective radiation; the latter is given by $E_n=E_0(1-CN^2)$ where E_0 = effective radiation

or a clear sky; N=mean cloudiness and C=coefficient expressing the effect of clouds upon effective radiation. Data on the variation of albedo over various surfaces and during seasons, the intensities of effective radiation for a cloud free sky, mean monthly values of effective radiation and of radiation balance and maps of the absorption of radiation and absorption of radiation balance in k cal/cm² for each month from April to Sept. and Dec. are presented. A detailed analysis is given of the principles of the geographic distribution of the radiation components in the Soviet and non-Soviet Arctic. *Subject Headings:* **1. Radiation balance computations 2. Albedo variations 3. Arctic.**—*I.L.D.*

12.9–27 551.511.33:551.526.6/8(98)

Laĭkhtman, D. L. and Kliuchnikova, L. A., **Rol' razvodii v teplovom balanse Arktiki.** [Role of open water surfaces in the heat balance of the Arctic.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 69:77–79, **1957.** fig., 2 tables, ref., 5 eqs. **DLC**—The effect of the open water surface in the ice field is discussed with the consideration of the turbulent flow of heat and water vapor between surface near ground (ice) and upper air, particularly during polar nights. The heat balance equation is used for the computation of the heat flow with data observed during the expedition of the Main Geophysical Observatory (G.G.O.) and Arctic Institute at 1955. (With air temperatures from −5°C to −30°C and with the width of open water surface varied from 100 to 5,000 mt.) The final results of computation indicate that the heat transferred from 5% area not covered by ice represents about 50% of total heat given up by the Arctic water. *Subject Headings:* **1. Arctic heat economy 2. Sea surface temperatures 3. Arctic.**—*N.P.S.*

12.9–28 91.04(98) 551.506.5:551.32(98)

Lotz, J. (*Geophysics Section, Canadian Defence Research Board*) and Sagar, R. B. (*Department of Geography, McGill University, Montreal*), **Meteorological work in northern Ellesmere Island, 1957–60.** *Weather*, London, 15(12):397–406, Dec. **1960.** 3 figs., 3 tables, 16 refs. **DLC**(QC851.W4)—This paper which is mainly concerned with the IGY expedition sponsored by the Canadian Defence Research Board begins with a brief account of previous expeditions in the same region. The IGY Expedition extended from April 1957 to Aug. 1958 and further glaciological and meteorological work was carried out in the summers of 1959 and 1960. A continuous weather record was kept at Hazen Camp from Aug. 1957 to Aug. 1958. Standard synoptic observations were taken for 08, 14 and 20 hr from May to Aug. in 1957 and 1958. The outstanding features of the observations and the prevailing synoptic conditions are discussed. Micrometeorological studies using thermistors and anemometers on a mast to a height of 10 metres were carried out from June to Aug. 1957 and May to Aug. 1958. Radiation studies were carried out from June to Aug. 1958 using a continuously recording Casella bimetallic actinograph and an Agmet flux radiometer. The glaciological work which was considerable is only briefly noted in this paper. Other studies described are those concerned with the ablation of the Gilman Glacier and the ice conditions of Lake Hazen. *Subject Headings:* **1. IGY expeditions 2. Synoptic conditions in northern Ellesmere Island 3. Ellesmere Island, Northwest Territories, Canada.**—*R.B.*

A7. ANTARCTIC

See also: **Antarctic geography** (Lebedev), 12.9–21; **Antarctic Expedit.-S. Pole** (Borchgrevink), 12.9–22; **Exploring polar regions** (Galbas) 12.9–90; **Ross Ice Shelf** (Thiel), 12.9–134; **Movement of Skelton Glacier, Ross Ice Shelf** (Wilson), 12.9–140; **Seismic obs.-Mirnyi** (Sytinskii), 12.9–166; **Seismic energy from underwater explosions** (O'Brien), 12.9–167; **Isotopes and temp. of Antarctic snow** (Picciotto), 12.9–400.

12.9–29 551.506.22:550.3:061.1(94)

Dwyer, L. J. (*Commonwealth Bureau of Met.*), **The International Antarctic Analysis Centre-Melbourne.** *World Meteorological Organization, WMO Bulletin*, 9(1):19–23, Jan. **1960.** 2 figs. **DWB, DLC**—The IAAC, Melbourne was established in 1959 as a result of the Meeting of the Special Committee for Antarctic Research (SCAR) in Moscow, August 1958. Several

member nations cooperate in rendering services, and material knowhow. This international headquarters concerns itself with the study and analysis of Antarctic data. Topographs of 700, 500 and 300 mb constant pressure charts over the area south of latitude 60°S are photographed, analyzed and microfilmed in monthly batches seven days after the end of each month. The present report covers the network, communications, working routine and staff members serving in the programme. The two charts included illustrate the network and the absolute topography of the region covered by October 1959. *Subject Headings:* **1. Antarctic data 2. International Antarctic Analysis Centre—Melbourne, Australia.**—*N.N.*

12.9–30 91.04(99) 551.506.22

Law, P. G., **Australian National Antarctic Research Expedition, 1958–59.** *Polar Record*, Cambridge, 10(64):55–58, Jan. **1960. DLC**—This is a supplementary account of the Australian Antarctic expedition, 1958–59. A previous account was published in the *Polar Record*, Vol. 9, No. 60, **1958,** p. 251–254 and earlier numbers. The present paper contains the lists of explorers engaged at Macquarie Island, Davis, Wilkes and Mawson. The last of these stations was manned by 28, led by IAN ADAMS. Meteorological and auroral studies were made at Taylor Glacier base throughout the winter. At Mawson and Davis, additional study of cosmic rays, ionospheric winds, geomagnetism, seismology and physiology was made. Wilkes station was officially handed over to the Australian Government by U. S. Navy Commander Price-Lewis. On Feb. 27, this expedition set sail for Australia, berthing at Hobart on March 3, 1959. *Subject Heading:* **1. Antarctic expeditions.**—*N.N.*

12.9–31 551.506.22(99)

Burkhanov, V. F., **Issledovaniia klimata Antarktiki.** [Investigations of the Antarctic climate.] (In: Sovetskaia Antarkticheskaia Ekspeditsiia, 1955–, **Klimat Antarktiki.** Moscow, **1959.** p. 7–28. 3 tables.) **DWB** (M82.1/99 M886kL0), **DLC** (QC994.9.K6)—The author presents a survey of Soviet research on the climate and meteorology of Antarctica since the beginning of the IGY. The contents of this paper include the following: an outline of the meteorological program at the Mirnyi Observatory during 1956–1958 (including the general and supplementary special observations); the organization of four temporary stations in 1956 for making observations on wind flow near Mirnyi; the first continental expedition in 1956 and the establishment of Pionerskaia; some geomorphological and meteorological characteristics of the "Oasis" meteorological station which began operation on Oct. 15, 1956; the establishment of the various inland continental stations including a brief account of their facilities; the scope of the meteorological work at the various inland continental stations including the observation routine; work of the weather service at Mirnyi and on expedition vessels; climatic investigations carried out by the marine Antarctic expedition; and a summary of preliminary conclusions on the atmospheric circulation over Antarctica, the temperature and wind regime, etc. Tables giving the scope of meteorological observations carried out by the Soviet Antarctic stations and those of other countries, their names, and coordinates; opening dates of the Soviet inland continental stations and numerical data on atmospheric temperatures, etc. are presented. *Subject Headings:* **1. Antarctic climate 2. Atmospheric circulation over Antarctica 3. Soviet Antarctic expeditions 4. Mirny, Antarctica 5. Pioneerskaia, Antarctica.**—*I.L.D.*

12.9–32 91.04(99) 551.506.5(99)

*Dzerdzeevskiĭ, B. L., **Pogoda v Antarktike v periode plavaniia dizel'elektrokhoda "Lena" v 1957 g. i nekotorye voprosy meteorologii iuzhnoĭ poliarnoĭ oblasti.** [The weather conditions in the Antarctic during the trip of the diesel electric ship "Lena" in 1957 and some meteorological problems of the South Polar region.] (In: Sovetskaia Antarkticheskaia Ekspeditsiia, 1955–, **Klimat Antarktiki.** Moscow, **1959.** p. 168–209. 9 figs., photos, 11 tables, 20 refs.) **DWB** (M82.1/99, M886kL), **DLC** (QC994.9.K6)—The meteorological and synoptic work of the Marine Antarctic Expedition on the "Lena" in 1956–1957 was characterized by the fact that the expedition carried out its investigation in the immediate vicinity of the Antarctic Coast line including landings and by the presence of aviation support which made observations over the continent. In this paper the author describes organization of the meteorological work of the expedition including the procedure of meteorological observations and atmospheric

mperature soundings, a description of the weather during the course of the expedition and a scussion of the synoptic meteorology of the polar regions of the southern hemisphere. Data atmospheric pressure, temperature, wind velocity, cloud cover and visibility, etc. at different ints maps showing state of the weather on the basis of simultaneous observation at different ints, maps showing the location of cyclone centers near Antarctica and photographs illustrat- g cloud types are presented. *Subject Headings:* **1. Synoptic meteorology of polar regions Soviet Antarctic expeditions 3. Meteorological data 4. Meteorological observation tech- ques 5. Antarctica.**—*I.L.D.*

12.9–33 551.513.2(99)

*Rastorguev, V. I. and Al'vares, Kh., **Opisanie Antarkticheskoi tsirkuliatsii, nabliudav- meisia s aprelia po noiabr' 1957 g.** [Description of the Antarctic circulation observed from pril to November 1957.] (In: Sovetskaia Antarkticheskaia Ekspeditsiia, 1955–, **Klimat ntarktiki.** Moscow, 1959. p. 110–167. 45 figs., 8 refs.) **DLC** (QC994.9K6), **DWB** M82.1/99 M886kL)—On the basis of an aerosynoptic analysis of meteorological data obtained t the IGY Weather Center at Little-America-V during April–Nov. 1957 the authors present preliminary picture of the circulation over Antarctica. The discussion includes the following: he characteristics of the pressure fields and temperature fields at the 700, 500 and 300 mb evels, the paths of surface anticyclones to the south and east from New Zealand to 120°W. ong. and to the south and east from the southern part of South America; the movement of urface cyclones to the Ross Sea across Wilkes Land and Victoria; cyclone trajectories from the Ross to the Weddell Sea, from the continent to the Weddell Sea to McKenzie Bay: anomalous retrograde) movement of cyclones in the regions of Berega Pravda and the Ross Sea; the teering current; trajectories of cyclones at the 700 mb level; the position of cyclonic regions; he characteristics of Antarctic fronts and of the tropopause. Mean monthly synoptic charts or the 700 mb, 500 mb and 300 mb levels, maps showing the trajectories of cyclones and anti- yclones at the surface and at the 700 mb level for the winter spring and fall, maps giving the requency of cyclones at the 500 mb and 300 mb level during winter and spring; and maps iving the temperature and pressure at the lower boundary of the tropopause during each month are presented. *Subject Headings:* **1. Atmospheric circulation over Antarctica 2. Aero- synoptic analysis 3. Antarctica.**—*I.L.D.*

12.9–34 551.501.9:551.324.24(99) 551.506.5(99)

Teterin, V. A., **Polgoda na ledianom plato.** [Half a year on an ice plateau.] (In: Sovets- kaia Antarkticheskaia Ekspeditsiia 1955–, **Klimat Antarktiki.** Moscow, 1959. p. 280–281.) **DLC** (QC994.9.K6), **DWB** (M82.1/99 M885kL)—A brief account is given of the setting up of the station Vostok-1 in continental Antarctica on March 30, 1957; this station is 635 km from the coast of the Indian Ocean and is about 3380 m. above sea level. This is followed by a summary of the meteorological work carried out during the first six months. There were made 700 weather observations, about 600 radiosonde observations, more than 500 observations on the aurora; etc. Atmospheric and snow cover temperatures at different levels were begun. Holes to depths of 15 m. were bored in order to make thermophysical observations. A mini- mum air temperature of −80°C is considered possible. During the winter air temperature of −70.1°C (May 9, 1957) and −73°C (July 13, 1957) were measured. *Subject Headings:* **1. Soviet Antarctic stations 2. Meteorological observations 3. Thermophysical observations 4. Antarctica.**—*I.L.D.*

A8. IGY

See also: **Soviet Ant. climate investig.** (Burkhanov), 12.9–31; **Ant. atmos. circulation-1957** (Rastorguev, Al'vares), 12.9-33; **Vostok IGY Station-1957** (Teterin), 12.9–34; **IGY micrometeorite meas.** (Dubin), 12.9–193.

12.9–35 550.3:551.506.22(73)

Reed, John C., **United States IGY Arctic program.** *American Geophysical Union, Geophysical Monographs*, No. 2:207–210, 1958. **DLC**—A description is given of the U. S. IGY Arctic program especially that being carried out in the Arctic Ocean. The U. S. IGY effort

in the Arctic is being carried out in Greenland, Canada, Alaska and the Arctic Ocean over 150° of longitude. The establishment of the two drifting stations, the responsibility for the establishment, maintenance and conduct of these stations and execution of the IGY program and instrumentation are described. At Station A research is carried out on the aurora and airglow and on the heat exchange at the ice atmosphere, interface and ice-ocean interface and the relationship of the heat exchange between the ice pack and its atmospheric and oceanic environments to seasonal variations in thickness, and thermal regimes of the ice pack. Surface, synoptic and radiosonde observations are made and oceanographic observations on temperature, salinity and oxygen content of the waters, measurements of ambient noise level in the Arctic Basin, etc. are carried out. On Drifting Station B the United States Weather Bureau is conducting a meteorological program including studies on radiation, CO_2, precipitation, chemistry and snow crystals. Also bottom cores are being taken, age determination, gravimeter measurements, ionospheric determinations, etc., are being carried out. *Subject Headings:* **1. IGY Arctic program 2. Arctic.**—*I.L.D.*

12.9–36 551.506.22:551.510.721

Facy, Léopold, **Bilan des mesures de radioactivité artificielle pendant l'Année Géophysique Internationale.** [Balance of measurements of artificial radioactivity during the IGY.] *Geofisica e Meteorologia*, Genoa, 8(3/4):33–37, **1960.** 10 figs., table. French and English summaries p. 37. **DLC**—The author brings out the more important points of the results obtained through the measurements of artificial radioactivity carried out during the IGY. After some general remarks on the time of residence of the radioactive fallout in the stratosphere and in the troposphere, he presents a few curves of the radioactivity of air and of precipitations established through the most recent publications. *Subject Headings:* **1. IGY artificial radioactivity program 2. Radioactive fallout.**—*Author's abstract.*

12.9–37 551.506.22:550.385.4:061.6

International Scientific Radio Union, **Année Géophysique Internationale: activités de l'Agence Mondiale d'Avertissement.** [International Geophysical Year: activities of the World Warning Bureau.] Its *Bulletin d'Information*, Brussels, No. 121:21–26, May/June **1960.** 3 tables. **DLC**—During the IGY, 21 special world intervals with a total of 45 days have been declared by the World Warning Bureau. Sixteen of these intervals have been followed by 18 geomagnetic perturbations, as indicated by the magnetograms of Fredericksburg, Va. (U. S.) (Table 1). The geomagnetic characteristics of these intervals are briefly explained. In addition, 40 periods of solar warnings have been registered during the IGY, i.e. 193 days (Table 2). Thirty-five geomagnetic perturbations indicated by the magnetograms of Fredericksburg occurred during 24 of these warnings. Finally, table 3 gives the list of the geomagnetic perturbations during the IGY as based on the index Δp prepared by J. BARTELS. *Subject Headings:* **1. Special world intervals 2. Geomagnetic perturbation registration 3. Fredericksburg, Virginia**—*A.V.*

12.9–38 91.04(98) 551.506.5(98)

Liljequist, Gösta H., **Murchison Bay: den svensk-finsk-schweiziska expeditionen till Nordostlandet 1957–1958.** [Murchison Bay: the Swedish-Finnish-Swiss Expedition to North-East Land, 1957–1958.] *Ymer*, Stockholm, 79(2):81–139, **1959.** 28 figs., (incl. photos). Appendices: Helimäki, Ilmari, **Aerologi,** p. 126–127. Liljequist, Gösta H., **Allmän meteorologi,** p. 127–130. Wärme, Karl Erik, **Atmosfärisk kemo,** p. 130–131. Jundo, Andre, **Atmosfärisk elektricitet och radioaktivitet,** p. 132. Dyrin, Eric, **Kosmisk strålning,** p. 133–134. Molander, Sveneric, **Norrsken,** p. 134–135. Borg, Kjell, **Jordmagnetism,** p. 135–136. Aro, Matti J. T., **Medicin,** p. 136–138. Bäckstedt, Carl-Axel, **Radiostation och radioförbindelser,** p. 138–139. **DWB, DLC**—The account includes a list of the 13 members of the expedition (8 Swedes, 2 Finns, 2 Swiss) and gives a description of the scientific activities and the daily life during the over-wintering at the permanent station at Murchison Bay (lat. 80°03′N., long. 8°15′E. Gr.) and the sub-surface snow cave at the Vestisen Station. A brief summary of the various scientific tasks and observation is appended. *Subject Headings:* **1. Arctic expeditions 2 Murchison Bay, North-East Land, Spitsbergen.**—*W.N.*

12.9–39 91.04(984) 551.506.22 551.5:550.3:061.3

Niewodniczański, Henryk, **Przemówienie inauguracyjne na konferencji, poświeconej omówieniu wstępnych wyników wyprawy Spitsbergeńskiej.** [Opening address at the conference on first preliminary results of the expedition to Spitsbergen.] *Przeglad Geofizyczny*, Warsaw, 3(2):79–80, 1958. **DWB, DLC.** And Manczárksi, Stefan, **Organizacja wyprawy Spitsbergeńskiej.** [Organization of the expedition to Spitsbergen.] p. 85–94. **DWB, DLC.** Also: Rózycki, Stefan Zbigniew, **Cele badawcze Polskiej wyprawy Spitsbergeńskiej.** [Research objectives of the Polish expedition to Spitsbergen.] p. 81–84. **DWB, DLC**—The first paper is the opening address by the chairman of the Polish IGY Committee affiliated with the Polish Academy of Sciences. Importance of the Spitsbergen expedition, the main Polish contribution to IGY is pointed out, and the necessity of a speedy and effective processing of the important observation material is stressed. The second paper contains detailed information on the organization, staff, quantity and source of scientific, transportation and housing equipment of the expedition which was well outfitted for productive scientific work. The third paper points out that the main objectives are not only to present a full picture of natural conditions prevailing at present in Southern Spitsbergen and to take part in diverse geophysical studies connected with the IGY program, but also to renew the old traditions of exploration and to acquaint the new generation of Polish investigators with problems of the Arctic. *Subject Headings:* **1. IGY-Spitsbergen expedition 2. Polish participation in IGY in Spitsbergen.**—*A.M.P.*

12.9–40 551.506.7:551.513:551.43(235.2)

Romanov, N. N., **Pamir-Tian Skan'skaia aerologicheskaia ekspeditsiia.** [Pamir-Tian Shan Aerological Expedition.] *Meteorologiia i Gidrologiia*, No. 2:26–28, Feb. **1957.** ref. **DWB, DLC**—The Pamir-Tian Shan Aerological expedition completed its field work in 1956. It was organized in preparation for the IGY by the Institute of Mathematics and Mechanics of the Academy of Sciences of the Uzbek SSR and the Tashkent Geophysical Observatory. By aerological means the expedition investigated the effect of the mountain system of Central Asia upon the atmospheric circulation. Wind and temperature sounding points were so selected as to provide a vertical cross-section close to the meridian, and including the mountain ranges. Some of the results are as follows: no distinct mountain valley circulation could be established in the valley of the Oxus River. The meteorological characteristics of periods with intense dust haze in the Pamirs, the synoptic conditions of central Asia, extent of penetration of the Indian Monsoon, etc. were investigated. *Subject Headings:* **1. Meteorological expeditions 2. Orographic effects on atmospheric circulation 3. Upper air circulation 4. Pamirs 5. Tien Shan Mountains.**—*I.L.D.*

12.9–41 551.506.22 551.5:550.31:061.3

Webster, H. C. (*Dept. of Physics, Univ. of Queensland, Brisbane*), **The International Geophysical Year.** *Australian Journal of Science*, Sydney, 22(5):181–186, Nov. **1959.** photo. **LC**—A discussion of some of the problems which the activities of the IGY were designed to solve, with a few comments on the results obtained. The general philosophy behind the IGY is explained. The aim was to coordinate a system of observations over the whole of the earth's surface in order to differentiate world wide from purely local phenomena. The IGY program included the specific study of land masses, but included a variety of observations on those parts of the earth's surface covered by water or ice. Observations in seismology, in oceanography and meteorology are described and their results discussed. *Subject Heading:* **1. International Geophysical Year program.**—*I.S.*

A9. CONFERENCES—SYMPOSIA

See: **Symposium on ionized gases in magnetic fields** (Japan Science Council, Ion. Res. Comm.), 12.9-2; **First weather reconnaissance system symposia** (U. of Mich.), 12.9–3; **AGU Report on 12th Conf.-Helsinki** (I.U.G.G.), 12.9–4; **Polish Spits. Exped.** (Niewodniczański), 12.9–39.

A10. SOCIETIES, SERVICES AND INSTITUTIONS

See also: **Int. Antarctic Analysis Center** (Dwyer), 12.9–29; **Founders of Japanese Weather Service** (Arakawa), 12.9–56; **Geophysical research in France** (Jobert), 12.9–142; **New seismic stations in Siberia and Far East** (Priroda), 12.9–164; **Earthquake Research Inst.** (Tokyo Univ.), 12.9–165; **Aerological Station, Odessa** (Artememko), 12.9–262; **Practice forecast program** (U. S. Weather Bureau), 12.9–291.

12.9–42 551.5:061.2(437)

Gregor, Alois, **Ustavení Československé meteorologické společnosti.** [Foundation of a Czechoslovak Meteorological Society.] *Meteorologické Zprávy*, Prague, 12(1):26–27, **1959.** **DWB, DLC**—The Czechoslovak Meteorological Society was founded on Dec. 17, 1958, in Prague. The Society promotes the development of meteorology, climatology, and bioclimatology and other related sciences. *Subject Headings:* **1. Meteorological societies 2. Czechoslovak Meteorological Society.**—*J.N.*

12.9–43 551.5:06

Petterssen, Sverre (*Pres. Amer. Met. Soc.*), **1959: a year of growth.** *Weatherwise*, Boston, 13(1):3–5, Feb. **1960.** 3 photos. **DWB**—The importance of meteorology among the other physical sciences should be stressed by creating an awareness of the multitude of scientific problems concerning the atmosphere, especially the diverse problems of the stratosphere, ionosphere, and beyond. During 1959, important steps were taken to encourage further research and to insure a proper supply of manpower. A committee consisting of meteorological representatives from 14 universities developed into the University Corporation for Atmospheric Research, and this group in turn, with the support of the National Science Foundation, laid plans for the creation of a National Institute for Atmospheric Research. To develop manpower, various projects in meteorological education were initiated during the year; emphasis was placed on programs designed to interest young college and high school students in meteorological careers. *Subject Headings:* **1. Meteorology reports 2. Atmospheric research.**—*R. S. Quiros.*

12.9–44 551.5:331.71

Petterssen, Sverre, **Meteorology as a science and a service.** *American Meteorology Society, Bulletin*, 41(9):483–488, Sept. **1960.** 4 tables. **DWB, DLC**—In his presidential address before the 40th Anniversary meeting SVERRE PETTERSON included, as one of the problems of meteorological science, that of available personnel in the field of meteorology. Most of the meteorologists are engaged in activities other than education and research. Thus there are very few people available for scientific work. The influx of new talent is low. *Subject Headings:* **1. Meteorological science problems 2. Meteorology profession.**—*A.H.K.*

12.9–45 551.5:06

Petterssen, Sverre (*Univ. Chicago*), **Expected developments in meteorology during the coming ten-year period.** *American Meteorological Society, Bulletin*, 41(10):548–552, Oct. **1960.** **DWB, DLC**—This paper briefly surveys the present state of affairs in meteorology and shows the developments that can be expected in the field, as well as the work which is needed to realize them. The problem of acquisition of highly trained personnel is especially emphasized. The creation of stable research programs is suggested, and of such facilities and opportunities which will attract new talent to meteorology and related fields in the earth and space sciences. *Subject Headings:* **1. Meteorological programs 2. Meteorological education.**—*I.S.*

12.9–46 551.5(73):061.2

American Meteorological Society, **Sketches from the 40th Anniversary Meeting, Jan. 19–22, 1960.** *American Meteorological Society, Bulletin*, 41(9):461–477, Sept. **1960.** 22 photos. **DWB, DLC**—An account is given of the Anniversary meeting in Boston, including the awards granted by President SVERRE PETTERSSEN at Honor's night. Other activities included election of the new officers of the Society and the investiture of certified consulting meteorologists. Lists are given of the large number of people who took part in the convention. *Subject Heading:* **1. American Meteorological Society 40th Anniversary Meeting.**—*A.H.K.*

12.9–47 5:061.2(493.6)

Sauvenier-Goffin, Elisabeth, **La Société Royale des Sciences de Liège. Ses fondateurs, ses publications.** [The "Société Royale des Sciences de Liège": its founders, its publications.] *Société Royale des Sciences de Liège, Mémoires in* −8°, 5th Ser., 2(2), **1960.** 52 p.—The Société Royale des Sciences de Liège, founded on March 2, 1835 has just celebrated its 125th anniversary. This **Memoir** summarizes the history of the Society, pays homage to those who founded it and who contributed to its international scientific position. The author emphasizes the scientific value of its members and of its publications, and the role played by the latter in the scientific movement. Three lists are included in the **Memoir**; the first indicates the Society's members on Jan. 1, 1960, the second provides the names of the corresponding members and the third is a list of the corresponding academies and scientific associations. *Subject Headings:* **1. History of the Société Royale des Sciences de Liège 2. Société Royale des Sciences de Liège, Belgium.**—*A.V.*

12.9–48 551.521(08) 551.510.534(08)

Atmospheric ozone and radiation. *World Meteorological Organization, WMO Bulletin,* 9(4):201–202, Oct. **1959. DWB**—A note on the Symposium on Atmospheric Ozone and Radiation held July 20–26, 1959 at the Clarendon Laboratory in Oxford, England, jointly sponsored by WMO and the International Union of Geodesy and Geophysics. Among the subjects covered in the atmospheric ozone section were ozone instruments; evaluation and accuracy of data of total ozone; relations of ozone with upper-air data in Polar regions and elsewhere; tropospheric ozone; vertical distribution of ozone from radiosondes and airoplanes and from weather and measurements. In the radiation section papers were on the radiation results of the IGY; on surface instrumentation; on the observation and computation of terrestrial radiation; on spectroscopic methods and on meteorological satellite programs. In all, some hundred papers were read. *Subject Headings:* **1. Radiation conferences 2. Ozone conferences 3. Oxford, England.**—*I.S.*

12.9–49 551.510.534:061.3

International Union of Geodesy and Geophysics. Association of Meteorology and Atmospheric Physics, **Symposium on Atmospheric Ozone, Oxford, July 20–25, 1959, organized by the Commission for Atmospheric Ozone.** *International Union of Geodesy and Geophysics, Monographie* No. 3, Jan. **1960.** 40 p. numerous figs., table, some eqs. **DWB**—A Symposium on Atmospheric Ozone was held at Oxford University under the joint sponsorship of International Association of Meteorology and Atmospheric Physics and World Meteorological Organization. The following subjects were dealt with (1) Vertical distribution of ozone from radiosondes and aeroplane measurements. (2) Vertical distribution of ozone from Umkehr measurements. (3) Relations of ozone with upper air data in polar regions. (4) Ozone measurement instruments. (5) Evaluation and accuracy of data of total ozone. (6) World-wide variations in vertical distribution of ozone. (7) Tropospheric ozone. The scientists who attended include: W. C. Swinhawk of Australia; W. L. Godson of Canada; A. Ehwert of Germany; A. D. Belmont of U. S.; K. R. Ramanathan of India and Budyko of Soviet Union. Some important papers include (1) On the day to day variations of the vertical ozone distribution by H. K. Paetzold. (2) Evaluation and accuracy of data of total ozone by K. Laugle. (3) World wide variations in vertical distribution of ozone and relations with stratospheric circulation by R. C. Sutcliffe. Many other important papers were read. *Subject Headings:* **1. Ozone conferences 2. Symposium on Atmospheric Ozone and Radiation, Oxford, Eng., 1959 3. Ozone distribution.**—*A.H.K.*

12.9–50 551.521:061.3

International Union of Geodesy and Geophysics. Association of Meteorology and Atmospheric Physics, **Symposium on Radiation, Oxford, July 20–25, 1959, organized by the International Radiation Commission.** *International Union of Geodesy and Geophysics, Monographie* No. 4, Jan. **1960.** 43 p. numerous tables, refs. and eqs. **DWB**—A symposium on radiation was held in Oxford in July, 1959. The president of the Symposium, Dr. Holler, gave an account of the attempts to incorporate the knowledge of the radiative heat sources into the theories of the circulation of atmosphere. During 7 sessions of the symposium different

subjects were discussed. They include: (1) radiation measurement during IGY; (2) surface instrumentation; (3) satellite and rocket programs; (4) observation and computation of terrestrial radiation; (5) transmission of solar radiation in the free air and clouds; (6) spectroscopic methods; (7) applied solar energy. The scientists who attended the seminar included: (1) M. Alaka (WMO); (2) R. Anderson (Newport, U. S.); (3) K. Bultrich (Mainz, Germany); (4) G. Cena (Rome, Italy); (5) P. R. Gasi (Cambridge, Mass.) and many others. *Subject Headings:* **1. Radiation conferences 2. Symposium on Atmospheric Ozone and Radiation, Oxford, Eng., 1959.**—*A.H.K.*

12.9–51 551.590.21:551.510.52

Spiridonova, Iu. V., **Soveshchanie po probleme Solntse-Troposfera.** [The conference on the problem of Sun-Troposphere.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geograf.* No. 3:157–159, 1960. **DWB**—A report on the proceedings of an interdepartmental conference on Sun-Troposphere problems held in Leningrad during Feb. 8–11, 1960. Brief summaries of some of the various papers delivered are given. A. A. Girs maintained that increase of solar activity is accompanied by increased intensity of the general atmospheric circulation and predominance of meridional processes over zonal processes. B. A. Apollov examined the relationship of the curve of Wolf numbers for 50 yrs to fluctuation of the Volga runoff and level of the Caspian Sea and obtained a high inverse correlation coefficient (−0.7, −0.9). S. T. Kostin showed an 11-yr periodicity in the growth of annual tree rings and established an inverse relationship with solar activity; he attributed to increased solar activity the observed disiccation of forests and tree groves in the European USSR in the thirties; namely, intensified general atmospheric circulation and interlatitudinal exchanges brings about an increased frequency of abnormal years including dry years. L. A. Vitel's proposed a theory according to which it is possible to forecast the effect of corpuscular incursions upon processes in the lower troposphere. Depending upon the sign of the pressure field in a given layer the corpuscular incursions can either stimulate or dampen cyclones and anticyclones of lower layers. V. I. Suzonov attempted to establish a relationship between short period solar activity and the formation of macrosynoptic processes. Various papers dealt with evaluation of the use of solar activity as an indicator for forecasting synoptic processes. B. M. Rubashev using the circulation types of B. L. Dzerdzeevskiĭ analyzed the probability of formation of positive and negative anomalies of zonal and meridional processes in relation to the variation of solar activity, etc. *Subject Headings:* **1. Sun-troposphere relationship conferences 2. Solar activity and weather 3. Leningrad, U.S.S.R.**—*I.L.D.*

12.9–52 551.510.52:061.3:551.590.21

Kolobkov, N. V., **Soveshchanie po probleme "Solntse-troposfera."** [Conference on the "Sun-troposphere" problem.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:51–52, June 1960. **DWB.** Trans. into English by W. O. Roberts, available. **DWB**—A short report of the interdepartmental conference on the "Sun-troposphere" problem, held in Leningrad and at the Pulkovo Astronomical Observatory in Feb. 1960. The number of participants was one hundred and twenty-seven, representing 25 scientific institutions. Sixteen of the participating institutes presented 23 reports. The areas covered in these reports were atmospheric circulation, variations of basic hydrometeorological characteristics, sun physics, biology and medicine, climate variations, forestry, and notable weather phenomena on the Earth. *Subject Headings:* **1. Sun-troposphere relationships 2. Conferences.**—*I.S.*

A11. EDUCATION—HISTORY—BIOGRAPHY—BIBLIOGRAPHY

History

See also: **New York weather obs.-1609** (Ludlum), 12.9–59; **Horiz. visibility theory of Bouguer-Lambert** (Middleton), 12.9–432.

12.9–53 551.5(68)(09)

South Africa. Weather Bureau, **History of meteorology in South Africa.** Special centenary issue of its *Nuusbrief*. *News Letter* No. 139, Oct. 1960. 37 p. 9 figs., numerous

hotos. **DWB**—This Centenary Edition of the Weather Bureau News Letter presents a hort review of the history of the South African Weather Service. The establishment of a Meteorological Committee" of the Cape of Good Hope was officially announced on 26 October 860. Meteorological activities in the other three provinces, Natal, Orange Free State and ransvaal began in the 19th century. Shortly after the proclamation of union the Weather ervices of the four provinces were amalgamated and thus on 1 April 1912 the new Union Veather Service was established in Pretoria. The gradual expansion of the Weather Service ctivities, including publications and observational facilities, is described. Brief sketches of he work and life of various men who played an instrumental part in the development of the Veather Service are also given. *Subject Headings:* **1. Meteorology history 2. Weather ervices histories 3. South Africa.**—*I.S.*

12.9–54 551.506(438)(09)

Rojecki, Ananiasz, **Étude sur un fragment retrouvé de résultats d'observations météoro-giques faites à Varsovie il y a trois cents ans.** [Study of a recently discovered fragment on sults of meteorological observations made at Warsaw 300 years ago.] *Acta Geophysica olonica*, Warsaw, 7(3/4):401–404, **1959.** fig., 5 refs. Polish summary p. 404. **DWB, DLC**—copy of a note estimated to be 300 yrs old records meteorological data in Latin. The data ay have been collected in Warsaw where the note (fragment) was discovered. *Subject eadings:* **1. Meteorological data 2. Historical meteorological data 3. Warsaw, Poland.** -*E.Z.S.*

12.9–55 551.501.9 551.5:92

Glasspoole, J., **Centenary celebrations at Ross-on-Wye Observatory.** *Weather*, London, 4(10):328–330, Oct. **1959.** photo. **DWB.** Also: Veryard, R. G., **A centenary of observa-ons at Ross-on-Wye,** *Meteorological Magazine*, London, 88(1047):280–281, Oct. **1959. DWB, LC**—A short report of the celebrations in honor of a century of weather records, which took lace in the enclosure of the Ross-on-Wye Observatory on July 17. Three names are men-oned: HENRY SOUTHALL, J.P., who commenced a systematic rainfall record in 1859, MRS. ARCHAS, who made possible the continuation of the Observatory after death of MR. SOUTHALL, nd also F. J. PARSONS, who has been responsible for the observations since 1914. At the eremony the activities of the stations during the past 100 yrs were recalled. A photograph aken at the occasion is included. *Subject Headings:* **1. Commemoratives 2. Weather records Ross-on-Wye, Eng.**—*I.S.*

12.9–56 551.5:061.1(52)(09)

Arakawa, H., **Founders of the Japanese Weather Service.** *Journal of Meteorological esearch*, Tokyo, 11(8):731–732, Aug., **1959.** table. In Japanese. **DWB, DLC**—This rticle gives a personnel directory, official position and staff organization of the Weather ervice from 1874 to 1886. Weather Service was a part of the Bureau of Geographv in the epartment of Interior before it was transferred to the Department of Education in 1895. n 1886 there were only 11 employees. *Subject Headings:* **1. Weather services 2. Japan.** -*K.C.*

BIOGRAPHY

12.9–57 551.5:92

Reichelderfer, F. W., **The Rossby Memorial Volume: The atmosphere and the sea in otion.** *World Meteorological Organization, WMO Bulletin*, 9(3):139–144, July **1960.** 2 hotos. **DWB**—CARL ROSSBY was deeply interested in the problem of international coopera-on. Many authors of international fame have paid tribute to his genius in this Memorial olume, which contains 38 papers contributed by 43 different authors, plus one paper by Rossby imself, and a bibliography of his publications. Rossby was responsible for organizing the epartments of meteorology at M.I.T., University of Chicago, and the University of California. le rendered great service to the science of meteorology. (For abstract on this **Memorial olume,** *see* 11.1–1, Jan. 1960, *Met. Abs.*) *Subject Heading:* **1. Rossby Memorial Volume.** -*A.H.K.*

12.9–58 550.3:92

Byerly, Perry (*Univ. Calif.*), [**Obituary of**] **Beno Gutenberg, geophysicist.** *Science*, Wash., D. C., 131(3405):965–966, April 1, **1960.** photo. **DLC**—GUTENBERG's particular discovery was the low-velocity layer in the earth just below the Mohorovičič discontinuity. His devotion to seismology and meteorology and his outstanding contributions are given in brief. *Subject Headings:* **1. Obituary of Beno Gutenberg 2. Gutenberg, Beno.**—*E.Z.S.*

12.9–59 551.5:92

Ludlum, David M., **New York's first weatherman.** *Weatherwise*, Boston, 12(3):95–97, June **1959.** 2 figs. **DWB**—ROBERT JUET of Limehouse, Eng., an associate of HENRY HUDSON, is described as New York's first weatherman. JUET served as a member of the crew in the 3 voyages to the Middle Atlantic and New England shores. When he came in Sept. 1609, there was a persistent anticyclonic regime with weather mainly fair and hot, but after a month a severe northeaster swept the area around Manhattan Island giving him some anxious moments. He notes the surroundings and describes the events, meteorological and otherwise, of the voyage. At the end of the paper a condensed chronicle containing all references to the weather are given from his descriptive diary. A picture of the New York's first weathership, the Half Moon, in which HENRY HUDSON explored the Hudson river region is also reproduced. *Subject Headings:* **1. Weathermen 2. Biography of Robert Juet 3. Weatherships.**—*I.S.*

12.9–60 551.594.5:92

Hylleraas, Egil, [**Biographical sketch of**] **Professor L. Vegard [on his 80th birthday Feb. 3, 1960.**] *Fra Fysikkens Verden, Blindern*, Norway, 21(2):241–244, Dec. **1959.** port. **DLC**—The highest Norwegian distinction, the St. Olav order, was awarded to VEGARD for his contribution to Norwegian science, specifically in relation to the aurora borealis research at Tromsö Observatory. Since VEGARD retired some 8–10 years ago from his leadership of the Physical Institute, Oslo Univ., his activities have increased to include ice research. His civic and political activities are mentioned; the scientist is still active. *Subject Headings:* **1. Vegard, L. 2. Biography of L. Vegard 3. Meteorologists.**—*N.N.*

12.9–61 551.586:92

†Eckel, Othmar, [**Obituary of**] **Dr. Franz Sauberer.** *Wetter und Leben*, Vienna, 11(8/10):119–124, **1959.** photo. List of scientific publications of SAUBERER, p. 121–124 (95 titles). **DWB**—Among his numerous studies were those of the investigations of the effects of radiation on human, plant and animal life. He made serious studies on the effects of radiation of the sea and effects of frost on agriculture. His recent work on **Plants and Radiation** was outstanding. This publication, *Wetter und Leben*, was founded by SAUBERER. His loss is mourned. *Subject Headings:* **1. Obituary of Dr. Franz Sauberer 2. Sauberer, Franz 3. Bioclimatology.**—*E.Z.S.*

BIBLIOGRAPHY

12.9–62 551.507.362:016 629.19(030.8)

Gaynor, Frank, **Aerospace dictionary.** Introd. by Wernher von Braun. N. Y., Philosophical Library, **1960.** 260 p. List of publications from which material was used for the dictionary, preceeding introd. Price: $6.00. **DLC?**—Dictionary of essential terminology in space exploration containing more than two thousand scientific, technical and idiomatic terms and abbreviations. Definitions are brief, up-to-date, and to the point. Satellites launched through August 1959 (Discoverer VI) are identified. A few meteorological and astrophysical terms are included, but most of the terms deal with rocket hardware or rocketing. *Subject Headings:* **1. Aerospace dictionary 2. Astronautics glossaries.**—*M.R. and E.Z.S.*

12.9–63 551.582.3(59):016

†Grimes, Annie E., **Bibliography of climatic maps of Indochina.** Wash., D. C., U. S. Weather Bureau, Oct. **1960.** 19 p. 59 annotated titles, 24 refs. **DWB** (M(016) U587bi Maps) —This bibliography lists sources with climatic maps of Indochina. The reference to each

ource is accompanied with an abstract of the contents. 59 items have been listed, with bibographical reference by both the author and the subject headings. Map scales are included the abstracts. In cases, where this information is lacking scales have been determined by e use of a map scale indicator. The sources used in this bibliography are those available in e Weather Bureau Library, the Library of Congress and the Department of Agriculture ibrary. *Subject Headings:* **1. Climatic map bibliographies 2. Climatic maps of Indochina Indochina.**—*I.S.*

12.9–64 551.582.3(64):016

†Grimes, Annie E., **Bibliography of climatic maps of Morocco.** Wash., D. C., U. S. Weather ureau, Nov. **1960.** 8 p. 28 annotated titles. **DWB** (M(016) U586bmo Maps)—This ibliography consists of sources with climatic maps of Morocco, sections of Morocco and Northest Africa. 28 sources are listed, and each reference is accompanied with an abstract of the ontents of the source. These sources are listed both by the author and the subject headings. Map scales have been included in the abstracts except in the cases where printed information s not available. In these cases a map scale indicator is used to determine the scales. *Subject Headings:* **1. Climatic map bibliographies 2. Climatic maps of Morocco 3. Morocco.**—*I.S.*

12.9–65 551.586:61(438):016

Tyczka, S., **Piśmiennictwo polskie z bioklimatologii człowieka w latach 1930–1958.** [Bibography of Polish literature on human bioclimatology, 1930–1958.] *Przeglad Geofizyczny*, Varsaw, 4(2):153–161, 1959. Also: Rózànski, S. and Paszyński, J., **Piśmiennictwo polskie z ioklimatologii urbanistycznej (1930–1955).** [Bibliography of Polish literature on urban ioclimatology (1930–1955).] p. 161–162. **DWB, DLC**—Human bioclimatology is divided nto the following categories: 1) Fundamental works, textbooks and book reviews; 2) Radiation –illumination by sun rays; 3) Atmospheric electricity and air ionization; 4) Other meteorogical elements; 5) Complex factors; 6) Biological effect of the climate and of meteorological lements; 7) Climatic therapy. Urban bioclimatology, 1) Climatic problems in spacial lanning. *Subject Headings:* **1. Human bioclimatology bibliographies.**—*A.M.P.*

12.9–66 551.509.34(085)

U. S. Air Weather Service, **Catalogue of local forecast studies.** Its *AWS Bibliography*, No. 13, (Rev.), Feb. **1956.** 91 p.—Some thousand reports are listed in this catalogue of forecast tudies. Although a number of studies from other sources have been included the catalogue ontains mainly reports prepared by *AWS* activities since 1942. The studies are identified a) alphabetically by name of airport; b) alphabetically by name of city or nearby town; c) alphabetically by county, state, or island group; and within these alphabetically by airport; d) by AWS organizations. Requistioning procedure for the catalogued reports is also given. *Subject Heading:* **1. Local forecast studies.**—*I.S.*

B. APPLICATIONS

B1. AERONAUTICS

12.9–67 551.551:629.13

Parker, A. E., **Some effects of gusts on aircraft.** *Meteorological Magazine*, London, 88(1046):225–233, Aug./Sept. **1959.** 5 figs., table, ref., 8 eqs. **DWB, DLC**—It is shown that acceleration produced on an aircraft by a vertical gust is more effective than a horizontal gust, and a gust of a given magnitude does not necessarily produce a larger acceleration on a fast aircraft than on a slow one. In landing condition horizontal gusts are more important for slow aircraft. The effect of a given gust on a given aircraft is usually greater the greater the speed of the aircraft, but the effect of a given gust on a fast aircraft is not necessarily greater than its effect on a slow aircraft because the higher wing loading of the fast aircraft very largely offsets the effects of its higher speed. *Subject Heading:* **1. Gust effects on aircraft.**—*A.H.K.*

12.9–68 523.43

Ross, M. D., **Proposed observations of the Martian atmosphere.** (In: Institute of the Aeronautical Sciences, **Applications of manned stratospheric laboratories. 1959.** p. 43–53, 4 refs.) **DWB** (M(051) V847ap)—The Strato-Lab program for the exploration of space includes also STRONG's proposal concerning a spectrographic analysis of the planetary atmosphere of Mars. Initially an observation was planned, but due to failure of balloon during inflation the project had to be postponed. The present paper is a brief status report of this phase of the program, discussing the causes of the failure of the balloon and giving an indication of the future. *Subject Heading:* **1. Martian atmosphere.**—*I.S.*

12.9–69 551.5:629.13

Solomon, Irving and Spreen, William C. (*both, Air Weather Service*), **Computation of the distribution of maximum allowable gross takeoff weights for aircraft.** *Meteorological Monographs*, Boston, 4(22):80–88, May 1960. 7 figs., 3 tables, 4 refs. **DWB, DLC**—A method is presented whereby the distribution of maximum allowable gross takeoff weight can be computed for an aircraft from surface weather observations and runway length. The method involves the mathematical approximation of the aircraft manufacturer's performance nomographs. This permits a flexible interchange of meteorological factors with operational factors and the utilization of electronic computer capability to simulate operational conditions. Frequency distributions of maximum allowable gross takeoff weights are shown for the USAF Convair T-29C for Stead AFB at Reno, Nevada. *Subject Headings:* **1. Aircraft design 2. Aircraft-weather relations 3. Reno, Nevada.**—*Authors' abstract.*

12.9–70 551.501.7:551.507.352(268) 551.5:656.7(268)

Teich, M., **Meteorologische und fliegerische Erfahrungen im europäischen Polargebiet** [Meteorological and aviation experiences in European polar regions.] *Zeitschrift für Meteorologie*, Berlin, 14(5/6):135–141, May/June 1960. 2 figs. German and English summaries p. 136. **DWB, DLC**—This paper is an account of meteorological airborne reconnaissance over the Arctic Ocean in frontal areas, drizzle showers, visibility, wind, icing, electric phenomena, air navigation, and possibilities of emergency landings. *Subject Heading:* **1. Airborne meteorological studies 2. Arctic Ocean.**—*Author's abstract.*

12.9–71 551.509.318:551.55

Zbrozek, J. K. and Pasquill, F., **Note on conditions for which data on the power spectra of atmospheric turbulence are required.** *Great Britain, Aeronautical Research Council, Current Papers*, No. 474, 1960. 3 p., fig., 3 refs. (*A.R.C. Technical Report* 20,735, Rev.) **DWB** (629.1308 G786c)—Recent trends in aircraft design and performance have led to a preferance for describing turbulence in terms of power spectra. The turbulence "wavelengths" are broadly indicated as a function of altitude. Data and ideas now available on the spectrum of atmospheric turbulence are discussed. The amount of data required depends largely on the extent to which some generalized form of spectrum can be supported by the observations. The sort of generalization already hinted at, in which the spectrum is defined completely by a length scale and a R.M.S. value, would greatly simplify the whole process of obtaining, presenting and using the data. *Subject Headings:* **1. Turbulence wavelengths 2. Atmospheric turbulence spectra.**—*E.Z.S.*

B2. AGRICULTURE

See also: **Tropical agriculture textbook** (Tempany), 12.9–10; **Frost protection** (Peyer), 12.9–292; **Evap. from vegetation—Penman formula** (Makkink), 12.9–365; **Calculation of potential evapotransp.** (Rijtema), 12.9–366; **Evapotransp. data** (Valkeri), 12.9–367; **Water requirements for soil root zone** (van Eyden), 12.9–368; **Agr. drought statistics—S. Dakota** (Pengra) 12.9–394; **Drought—Mauritius** (Swan), 12.9–395.

12.9–72 551.58:63(948)

Christian, C. S. (*Chief, Div. of Land Res. and Reg. Survey, C. S. I. R. O., Canberra*), **The future revolution in agriculture in Northern Australia.** *Australian Journal of Science*, Sydney, 22(4):138–147, Oct. 1959. photo, 4 tables, 16 refs. **DLC**—A presidential address

discussing, in the light of post war research, the great possibilities of agricultural development in northern Australia. The suitable agricultural area comprises a coastal fringe having higher rainfall, hitherto regarded only as poor cattle country. Following a brief historical survey of the area, the information gathered to date concerning the agricultural development potentialities is discussed. This information consists of two types. The first includes the description and inventory of the natural land and agricultural resources of the region. The second concerns methods of utilization of these resources and the scientific understanding of the biological potential and limitations of the various environments. *Subject Heading:* **1. Agriculture 2. Northern Australia.**—*I.S.*

12.9–73 551.586:551.455(477)

Buchinskiĭ I. E.; Iovenko, N. G., Kekukh, A. M. et al., **Agroklimaticheskie osobennosti lesostepi USSR i Øbosnovanie effektivnosti chernykh parov v sevodorote.** [Agroclimatic characteristics of the forest steppe of the Ukrainian SSR and the reason for the effectiveness of black fallow in crop rotation.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 16:3–15, **1959.** 5 figs., 7 tables, 6 footnotes, 13 refs. **DWB**—The forest steppe of the Ukraine which has the most favorable climate in comparison to other parts of the U.S.S.R. is divided into three regions on the basis of moisture conditions; namely: the western, central and sourthern (south eastern) regions. The characteristics of each region are discussed with the aid of tables giving data on the hydrothermal coefficient (SELIANINOV) annual and summer precipitation, probability of rainless periods greater than 50% potential evaporation, supplies of productive moisture in the meter layer of the soil during the first ten day period after sowing of winter crops on fallow and non-fallow soil, moisture productivity of the cultivated soil layer (0–20 cm) in the decade of sowing of winter crops on fallow and non-fallow soil mean long period annual precipitation etc. The climate of the western region (west of the line Kamenets Podolski-Vinnitsa-Fastov) is characterized by a favorable moisture supply which not only excludes fallow fields from crop rotation but also allows annual cultivation of fodder or manure crops. In the central region (northwest of the line Gaivoron-Zlatopol'-Khar'kov) dry years predominate over years with sufficient moisture. During the decade of winter sowing the soil moisture supplies in non-fallow lands are only half of the supplies on black fallow; this together with the possible deficiency of autumn precipitation demonstrates the effectiveness of black fallow, especially in dry years. In the southern region bordering on the steppe zone the probability of dry years rises. In spite of some reduction in soil moisture supply on black fallow, it is nevertheless twice as large as the soil moisture on non-fallow soil. *Subject Headings:* **1. Climate of Ukraine forest steppe 2. Black fallow effects 3. Crop rotation 4. Ukrainian S.S.R. I. Sapozhnikova, S. A.**—*I.L.D.*

12.9–74 551.586:633.11:633.15

Buchinskiĭ, I. E., **Fitoklimat ozimoĭ pshenitsy i kukuruzy vo vremia sukhoveev.** [Phytoclimate of winter wheat and maize during dry winds.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 16:87–100, **1959.** 5 tables, 5 charts, 3 refs. **DWB**—When dry winds prevail the meteorological conditions within plantings of winter wheat and maize differ from those observed above the plantings. Differences in the phytoclimate of winter wheat and maize are connected also with the characteristics of the grass cover and the penetration of sunlight. The air temperature in winter wheat at the surface of the earth until spike formation is closely associated with the density of the grass cover; on densely covered soil the temperature gradients are negative. After spike formation it is warmer at a height of 0.2 m by 2°C than at above the plantings. The maximum differences observed ranged from −2.6°C to 6.8°C. In the case of maize plantings it was on the average 2°C warmer at the surface of the earth than at 2.0 m throughout the entire period. The maximum differences were between −1.7 and 7.9°C. The absolute humidity was on the average 1–2 mb greater at the surface of the earth although there were individual instances with negative gradients. The relative humidity until spike formation were generally greater at the surface of the earth by 4% and after spike formation by 1%. In maize, up to silking, the relative humidity usually had a negative gradient. The amount of moisture deficit in winter wheat until spike formation was on the average 1 mb larger than above plantings and in the case of maize these values were 2 mb larger. After spike formation the moisture deficit in

both crops was 3–4 mb larger at the surface of the earth than over the plantings. *Subject Headings:* **1. Winter wheat phytoclimate 2. Maize phytoclimate.**—*I.L.D.*

12.9–75 551.586:633.15(573)

Kalmykova, V. V., **Klimaticheski vozmozhnye raĭony vozdelyvaniia kukuruzy na Dal'nem Vostoke.** [Climatic regions suitable for maize cultivation in the Far East.] *Dal'nevostochnyĭ Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 7:74–106, **1959.** 3 figs. (1 fold), 7 tables, 3 charts, 12 refs. **DWB**—This study which is a continuation of the paper on agroclimatic characteristics of maize cultivation in the Primor'e Region (V. V. KALMYKOVA, *Trudy DV NIGMI* No. 6, 1958) is a comprehensive analysis of the climatic possibilities of cultivating maize in the Far East (Primor'e Region, Khabarovsk Region, Amur and Sakhalin oblasts). The climatic conditions are evaluated on the basis of heat and moisture provision for maize. The light provision was not considered, since it has been shown that length of day has no appreciable effect upon rate of maize development. The heat provisions for different varieties of maize was determined by comparing the temperature sums for attaining particular developmental phases with the thermal resources. The heat provision for maize was calculated for cultivation for grain and for silo storage. The moisture provision was determined by computing an index of moisture by dividing by 10 the hydrothermal coefficient (calculated by the method of G. T. SELIANINOV) which is equal numerically to the ratio of precipitation total for the period to the temperature, sums for the same period. Maps showing the thermal zones and moisture zones of the Far East are presented and data are given (both in the text and in an appendix) as the temperature sums, corresponding to individual developmental phases of maize, height above sea level above which the heat supply to maize falls by 80%, data on the probability of passage of soil temperature through 10°C and of injury to maize by spring sports for different dates of sowing, mean monthly totals of precipitation (numerator) and magnitude of hydrothermal coefficient (denominator), thermal resources of the Far East, mean long period value of the hydrothermal coefficient for the period July–Aug. by regions of the Far East agroclimatic analogues (according to two indices, temperature sums for the period with temperature above 10°C and the hydrothermal coefficient for the period June–Aug. for the Far East and other regions of the U.S.S.R., etc. *Subject Headings:* **1. Maize cultivation climate 2. Maritime Territory, USSR 3. Khabarovsk Region 4. Amur Oblast 5. Sakhalin Oblast, USSR.**—*I.L.D. and author's abstract.*

12.9–76 551.586:63:06(510)

Sinel'shchikov, V. V., **Razvitie agrometeorologii v Kitaĭskoi Narodnoĭ Respublike.** [The development of agrometeorology in the Chinese People's Republic.] *Meteorologiia i Gidrologiia*, Leningrad, 6:3–10, June **1959.** 3 photos. **DWB, DLC**—A tendentious article on the history of agricultural meteorology in Communist China. In 1953 the Geophysics Institute of the Chinese People's Republic together with the Institute of Agriculture of North China (now the Academy of Agricultural Sciences of the Chinese People's Republic) organized the first agrometeorological group in China. Its principal task was to familiarize China with agrometeorological research carried out abroad, especially in the Soviet Union, by means of translations, monographs etc. In 1956 the Peking Agricultural Academy organized the preparation of agricultural meteorologists in the Peking meteorological technical school. Agrometeorological work is being carried out also in the weather service and in the various branches of agriculture. The first agrometeorological observations were begun in 1954 in 12 stations of the weather service and by 1957 they were being carried out in 505 stations. Agrometeorological research is being conducted by the following: Academy of Agricultural Sciences, the Institute of Geography of The Academy of Sciences, agrometeorological sections of central and provincial meteorological directorates and observatories, meteorology departments of zonal scientific institutes and departments of meteorology of teaching institutions, etc. The popularization of agrometeorological knowledge among the farmers, including mass education, mass propaganda, the establishing of numerous agrometeorological stations, the extension of weather services etc. are described in detail. In 1958 agrometeorological observations were carried out in 1342 stations including 556 at which moisture determinations were made. At 108 stations measurements were made on evaporation from the soil surface and at 58 stations microclimatic

observations were carried out in agricultural fields. *Subject Headings:* **1. Agrometeorological services 2. China.**—*I.L.D.*

12.9–77 551.521:551.573:581.11:633.2

†Scholte Ubing, D. W., **Over stralingsmetingen, de warmtebalans en de verdamping van gras.** [Radiation measurements, heat balance and evapotranspiration of grass.] *Wageningen, Netherlands, Landbouwhogeschool, Mededelingen*, 59(10), **1959.** 93 p., 30 figs., 20 tables, eqs. bibliog. p. 89–93. **DLC**—The most important physical factors connected with water use and transpiration of different crops are discussed. The energy of heat balance and the different heat flux density terms, important for the heating of the soil and the air and evaporation of water are examined. Regression formulas, which give a relation between the radiant heat flux density and the state of the atmosphere as cloudiness or humidity of the air, and sources of energy different from radiation are also discussed. Water uptake by short grass from various depths in a sandy soil under low moisture stress (to study the potential evapotranspiration) and under high moisture stress (to study the decrease in evapotranspiration in growth and in yield) is studied. A description of the automatic measuring method, with which the moisture content in the root zone and its variations, both with time and depth, were recorded over very short time intervals during long periods and the results obtained are also given. The evapotranspiration, the growth and the yields are compared with the measured net radiation. The chap. II deals with evaporation. The most important factors which determine the evapotranspiration of a crop in a given interval are discussed: energy, latent heat of vaporization, available at the evaporating surface during the period; velocity of water supply to the evaporating surface; etc. Actual evapotranspiration has been compared with potential evapotranspiration. The author shows that the evaporation of an extended open thin water layer can be computed from an energy balance if all the terms are determined with sufficient accuracy. In chapter III, the complete energy balance is given in eq. (2) and fig. 2. Attention is drawn on the difficulties and precautions to take in computing the various terms of the energy balance. Chap. IV is devoted to the measurement of the net radiation. The "poor man's radiometer" theory of SUOMI and KUHN is explained. The discrepancy is weak between the measured net radiation and the net radiation computed by means of the author's formulas. Chap. V at last, deals with the evapotranspiration of short grass. *Subject Headings:* **1. Heat balance over grass surfaces 2. Evapotranspiration from crops 3. Evapotranspiration measurement techniques.**—*A. V. and author's abstract.*

B3. FORESTRY

See also: **Forestry Handbook** (Geiger), 12.9–13; **Cyclone effects on plantation—Mauritius Isl.** (Brouard), 12.9–320.

12.9–78 551.509.317:551.509.58:632.187

Beers, Francis D. (*U. S. W. B., Portland, Oreg.*) and Colson, Dever (*U. S. W. B., Wash., D. C.*), **Use of extended-range prognoses for fire-weather forecasting.** *Monthly Weather Review*, Wash., D. C., 88(4):131–136, April **1960.** 7 figs., 4 tables, 2 refs. **DWB, DLC**—In order to make the regular extended forecasts more directly applicable to fire-weather forecasting problems, the 5-day circulation patterns are studied to determine possible relationships with relative humidity in northwestern Oregon and with thunderstorm occurrences in the northern Rockies. An objective forecast technique is developed for the Sept. afternoon relative humidity in northwestern Oregon. The technique is based on the 5-day mean 700-mb heights of the coast, the 5-day mean 700-mb height gradients across the coast, and temperature anomalies for the period from 1949 through 1958. A similar objective forecast technique is developed for July and Aug. thunderstorm occurrences in 10 National Forests in western Montana and northern Idaho. This technique is based on 5-day mean 700-mb east–west and north–south height gradients and precipitation anomalies over the area for the period from 1954 through 1958. Contingency tables are prepared and skill scores computed using the developmental observed data and the prognostic data for the same period. The forecasts for the 1959 fire season, which were used operationally, are evaluated. *Subject Headings:*

1. Fire weather forecasts 2. Extended range forecasts 3. Northwest Oregon 4. Northern Rockies, U. S. A.—*Author's abstract.*

12.9–79 551.582.2:632.187(79)

*Lindquist, H. D. (*W. B. Airport Sta., Fire Wea. Service, Seattle, Wash.*), **Washington fire weather climatological data.** Seattle, Wash., Seattle-Tacoma Airport, U. S. W. B. Fire Weather Service, Feb. **1959.** 13 p. tables. **DWB** (M:634.9 L747wd)—Variable data related to forest fire protection are analyzed and summarized from Form 1009-E reports since 1924 for few stations and from the 130 reporting stations. The data consist of tables featuring average minimum relative humidity by decades for individual stations and selected districts. Humidity curves for April through Sept. are given by districts, followed by tabulation of duration of relative humidity for 1924–1958 with total for each year and for the entire period. Next the same data are shown for April–Sept., 1952–1958 for 37 stations. Then, average number of days with lightning storms for the districts April–Sept. 1936–1958 are summarized into extremes, max. and min. Finally a table of the easterly winds for the months of 1945–1952 is given. There are other factors more important than the winds which need emphasis as a means of preventing forest fires. *Subject Headings:* **1. Fire weather data 2. Washington (State).**—*W.N.*

12.9–80 551.511.6:551.558.1

Murgai, M. P. and Emmons, H. W. (*both, Pierce Hall, Harvard University*), **Natural convection above fires.** *Journal of Fluid Mechanics*, London, 8(4):611–624, Aug. **1960.** 17 figs., 6 refs., eqs. **DWB, DLC**—The turbulent natural convection above fires in a dry calm atmosphere with a constant lapse rate has been the subject of several recent investigations (see references). The present paper presents solution curves from which the natural convection may be computed over a fire of arbitrary size in an atmosphere with arbitrary lapse-rate variation. The independent parameters of fire size, energy release rate (buoyancy), momentum release rate and atmospheric lapse rate are given over the expected range of values. The arbitrary variation of lapse rate is thus calculable as piece-wise constant. *Subject Headings:* **1. Small scale turbulent convection 2. Atmospheric lapse rates.**—*Author's abstract.*

12.9–81 551.509.58:632.187

Schroeder, Mark J. (*U. S. W. B., Berkeley, Calif.*) and Countryman, Clive M. (*Pac. SW Forest and Range Exper. Sta., Berkeley, Calif.*), **Exploratory fireclimate surveys on prescribed burns.** *Monthly Weather Review*, Wash., D. C., 88(4):123–129, April **1960.** 8 figs., 7 refs. **DWB, DLC**—In the summer of 1957, short-term weather surveys were made in four prescribed burn areas in the central Sierra Nevada foothills and in the central Coast Range in California. The local fireclimate patterns were studied, a fire-weather forecast was adapted to the burn area for each fire, and attempts were made to note the effects of the fires on the fireclimate patterns. This paper describes the survey techniques used, gives an example of a forecast, and discusses some of the survey results. The latter include an increase in wind speed blowing out of the lee side of the fire, effects of the broadscale weather on the local patterns, downcanyon afternoon winds in east-facing canyons, and temperature observations and topographic effects on the lee side of a ridge. *Subject Headings:* **1. Fire climate surveys 2. Prescribed burns 3. Central California.**—*Author's abstract.*

12.9–82 551.506.1:551.582.2:632.187(711)

Turner, J. A. (*Met. Branch, Dept. of Transport, Canada*), **Forest fire-fighting in British Columbia's centennial summer.** *Weather*, London, 14(12):392–398, Dec. **1959.** fig., tables. **DWB**—A report of forest fires in British Columbia during the summer of 1958. It was also the year of British Columbia's hundredth birthday celebrations. Close to twelve hundred forest fires throughout the province were caused only by the fireworks. A photograph shows an after fire sight near Campbell River, Vancouver Island. Another map is included to show the British Columbia forest district. At the end comparative climatic data for 1958 is tabulated. The paper describes the major fires and gives a corresponding picture of the weather at the time of the fire outbreak. The total number of fires before the end of the summer was

four thousand causing two million acres of blackened snags. *Subject Headings:* **1. Forest fires 2. British Columbia, Canada.**—*I.S.*

12.9–83 551.58:632.187

Williams, D. E. (*Forest Research Div., Forestry Branch, Ottawa*), **Fire season severity rating.** *Canada, Dept. of Northern Affairs and National Resources. Forest Research Div., Technical Note No.* 73, **1959.** 13 p. 3 figs., 4 tables, 9 refs. **DA**—From an analysis of a large number of small-scale test fires, a fire severity factor for each class of fire danger was developed: Nil = 0, Low = 0.2, Moderate = 1.0, High = 4, and Extreme = 12. To find the fire season severity rating for an area, the severity factor for each fire danger class is multiplied by the number of days in the fire season falling into that class; the whole is totalled, and divided by the number of days in the fire season. A few of the many practical applications of the severity rating are briefly described. It can be used to compare the potential severity of fire seasons year by year, in one area, or between different areas. When it is plotted with actual fire data, an indication of the effect of factors other than fire weather can be assessed. The severity rating can also form the basis for further and more detailed studies. *Subject Headings:* **Fire severity indexes 2. Fire danger.**—*Author's abstract.*

B4. ENGINEERING—INDUSTRIAL

12.9–84 551.515.3:551.553.6:551.556.6(764)

Segner, E. P., Jr. (*A. & M. College of Texas*), **Estimates of minimum wind forces causing structural damage in the Dallas tornado.** *Meteorological Monographs*, Boston, 4(22):19–24, May **1960.** 14 figs., table. Also issued as *U. S. Weather Bureau, Research Paper*, No. 41: 159–175, **1960.** 9 figs., table. **DWB, DLC**—The minimum wind velocities required to produce some of the structural failures that occurred during the Dallas tornado of 2 April 1957 have been determined. Data on the wind velocities, were obtained from an analysis of many types of structures. In each case, the minimum or, in a few cases, the maximum wind velocities were computed based upon reasonable sequences or modes of failure. Although the results are limited by the assumptions required by the analysis, it is felt that they have considerable value as an indication of the relative magnitude of the wind velocities involved. *Subject Headings:* **1. Tornado, Dallas, Texas (Apr. 1957) 2. Tornado wind velocities 3. Dallas, Texas.**—*Author's abstract.*

12.9–85 551.524.36:697.13

Murphy, Allan H. (*Weather System Div., Travelers Insurance Co., Hartford, Conn.*), **Engineering meteorology: meteorology and heating load requirements.** *Meteorological Monographs*, Boston, 4(22):65–68, May **1960.** fig., table, 8 refs., 2 eqs. **DWB, DLC**—Temperature and other meteorological parameters, including wind velocity and solar radiation, have been examined to determine their individual and combined effects on fuel requirements. Regression methods established a correlation coefficient of 0.89 between standard degree-days and gas consumption for 147 days during the 1951–52 heating season. A temperature-refined and wind-adjusted degree-day yielded a correlation coefficient of 0.94, a material improvement in estimating the heating load. *Subject Headings:* **1. Engineering meteorology 2. Fuel requirements 3. Degree-day data.**—*Author's abstract.*

12.9–86 551.524.3:551.579.2:625.71

Legg, F. E., Jr. (*Mich. State Hwy. Dept.*), **Weathering tests of Portland-cement concrete for highways.** *Meteorological Monographs*, Boston, 4(22):92–98, May **1960.** 6 figs., 8 refs. **DWB, DLC**—In contrast to many types of construction, almost all of the product of the highway engineer is, of necessity, dispersed across the open countryside and therefore vulnerable to destructive weathering action. Slow deterioration of bituminous road binders may result from prolonged high atmospheric temperatures and exposure to the sun's radiation. In northern climates, seasonal and daily temperature changes occur, frequently passing through the freezing point. These temperature changes in the presence of snow or rain may be highly destructive to portland-cement concrete. The concrete technologist has, for some time,

sought accelerated laboratory tests by which he may predict longtime field performance. Bridges and pavements are rightfully expected to be enduring. One of the prevalent means of evaluating concrete is by laboratory freeze-thaw tests. The uncertainty of knowledge with respect to properly assessing climatic effects is exemplified by the fact that the American Society for Testing Materials now has four tentative freeze-thaw methods. These very greatly as to required temperature gradients and freezing media. Brief descriptions of these are given. One of the methods has been used for evaluating Michigan mineral aggregates in concrete. Prediction is made that the disciplines of the meteorologist could well be helpful to the concrete technologist if mutual understanding of the problems were developed. *Subject Headings:* **1. Temperature change effects 2. Weathering of materials 3. Highway engineering.**—*Author's abstract.*

12.9–87 551.5:6:061.6

Peterson, Roy E., **The versatile role of meteorology at General Mills.** *American Meteorological Society, Bulletin*, 39(6):327–331, June **1958.** 4 figs., 2 refs. **DWB**—The complex meteorological and engineering developments during the past 12 years at several branches and laboratories of General Mills are evidence of cooperation. The achievements within the frames of constant-pressure-level balloons (CPB), captive balloons, electrically powered lighter-than-air vehicles, etc. prompted development not only of new instrumentation but maintenance of a complete ever up-to-date weather service with stress on forecasting surface launching conditions and upper-air trajectories. Basic studies include trajectory, forecasting, synoptic applications of CPB-data, etc. Some major research and development programs are discussed with focus on meteorological progress, which to a great extent depend on free exchange of ideas. *Subject Headings:* **1. Industrial meteorology 2. Meteorological progress.**—*W.N.*

12.9–88 551.5:621.311.153.2

*†Davies, M. (*Central Electricity Generating Board*), **The relationship between weather and electricity demand.** *Institution of Electrical Engineers, Proceedings, Part C*, 106(9):27–37, March **1959.** 7 figs., 5 tables, 22 refs., 28 eqs. **DLC.** (Also published as *Inst. of Elec. Eng. Monograph* No. 314S, Oct. 1958)—The author describes a method for analyzing statistically the relationship between weather and electricity demand for application to practical load estimated by electricity supply engineers. A discussion of the characteristics of the specific meteorological elements to which the demand has been found to respond is included. They are: temperature, wind speed, cloud, visibility, and precipitation. *Subject Headings:* **1. Weather effects on electricity demand 2. Electric power system loads.**—*N.N.*

B5. MEDICINE

See also: **Heat wave mortality—Melbourne** (Rankin) 12.9–429.

12.9–89 551.586:616.248

†Daubert, K. (*Deutscher Wetterdienst*), **Atmosphärische Einflüsse bei der Ausläsung von Asthmaanfällen.** [Weather effects on asthma attacks.] *Allergie und Asthma*, Leipzig, 5(2):61–78, April **1959.** 14 figs., 2 tables, 80 refs. German and English summaries.—By means of an investigation of over 1,000 asthma cases the daily and yearly fluctuation in the incidence of asthma in the Tübingen area which is conditioned by endogenous and exogenous factors, will be demonstrated. Whilst unfavorable climatic conditions of long duration or influences of a psychic nature increase the tendency to asthma, additional stresses like thermal irritations (cooling and heating strains) and also complex effects of weather conditions play a significant part in producing asthma attacks. The positive result of asthma forecasts will be demonstrated and the climatic pre-conditions suitable for climatic therapy of asthma will be discussed. *Subject Headings:* **1. Weather effects on asthma 2. Asthma 3. Tübingen, Germany.**—*Author's abstract.*

12.9–90 551.586:615.9(98/99) 551.5:550.3(98)

Galbas, P. A. (*Norderney*), **Neue Erkenntnisse bei der Erforschung polarer Gebiete.** [New knowledge in exploring polar regions.] *Naturwissenschaftliche Rundschau*, Stuttgart,

(3):103–106, March 1960.—The ill-advised plan to make the Arctic region a dumping place for atomic residues is considered. The recently developed photogrammatical techniques are discussed in the second part of the paper. Aero-photographic cameras are appraised for use in triangulation, topography, aero-photography in geology and hydrology. Development of photogrammetry is emphasized for the international mapping of the world with in connection with polar flights. Aerological and atmospheric-optical problems in the stratosphere and at near-surface layers of the Arctic are treated in the last part of the survey. Refraction phenomena, problems of visibility, especially those of "overcast white-out" are on the program of the International Glacial Greenland Expedition of 1959/60. *Subject Headings:* **1. Polar medical research 2. Photogrammetric techniques in polar regions 3. Atmospheric-optic problems 4. International Glacial Greenland Expedition 5. Arctic.**—*O.T.*

12.9–91 551.586:551.43:612.014.4

Jungmann, Horst, **Über die biologische Wirkung des Hochgebirgsklimas auf den Menschen.** [The biological effect of high mountain climate on man (Summary only).] *Germany. Deutscher Wetterdienst, Berichte*, 8(54):80, **1959.** German summary p. 80. **DWB, DLC**—By examination of respiration, circulation, endocrene system and bodily activity, it is known that man does not react by means of a uniform transformation of his bodily functions in transition to high mountains. Instead the organism responds by means of multiple fluctuation of his automatic nervous system. Studies carried out by the Innsbruck Medical Clinic at elevations of 1000 m, 1200 m, 2000–3000 m, and at 4500 m in the Andes showed that the basic changes persist up to four weeks. *Subject Headings:* **1. Mountain bioclimatology 2. Altitude effects on man.**—*I.L.D.*

12.9–92 551.586:551.542:616.248

Nemoto, J.; Kawakami, T.; Tada, T. et al., **Relations between bronchial asthma and pressure pattern.** *Journal of Meteorological Research*, Tokyo, 12(3):143–146, March **1960.** 3 figs., 7 tables, 3 refs. In Japanese; English summary p. 143. **DWB, DLC**—In the previous report, the full details on an asthma patient for one year have been analysed and six pressure patterns related to spasm have been selected. In the present report, the authors show the results as follows: (1) the pressure pattern N, which is liable to cause inversion, is related to spasm in the case of Yokohama asthma. (2) In the test period from June to July, 1959, the pattern N and its similar are related to spasm for about 30 patients in Tokyo, Osaka and others, too. *Subject Headings:* **1. Bioclimatology 2. Bronchial asthma and pressure patterns 3. Japan. I. Kato, T.**—*Author's abstract.*

12.9–93 551.586:615.834

Trauner, L. (*Balneo-Klimatolog, Zagreb, Yugoslavia*), **Klimakurort—Kurortklima.** [Climatic health resort—health resort climate.] *Zeitschrift für Meteorologie*, Berlin, 13(1/6):17–21, Jan./June **1959.** 2 figs., 2 tables. German and English summaries p. 17. **DWB, DLC**—The terms climatic health resort and health resort climate are submitted for discussion. A climatic health resort is referred to as a place or an area essentially distinguished by a particular health resort climate and the availability of appropriate facilities for a climatic cure. A healing climate may be defined as the dynamical equilibrium of meteorological elements within physiologically optimum boundaries which practically include cooling power, sensitivity to climate, and duration of sunshine. Moreover, scientific investigations should cover terrestrial, cosmic, and atmospheric electric effects upon man, and his reaction to these factors. As to Yugoslav climatic health resorts the optimum boundaries of sensitivity to climate were found to be as follows: duration of climatic comfort; ⅔ of the year or season; cooling power; 10–14 mg Cal/sec·cm² (10–30 on the Adriatic coast; 20–30 in the mountains); sunshine duration; 1800–2800 hrs./annum. The utilization of a particular place for holiday-making, recreational or curative purposes respectively depends on the nature of its resort climate, and on the purpose and availability of appropriate facilities. The health resort climate denotes the specific local environs of a spa and/or peloid resort. The nature of such a milieu is coined by the local natural sources, e.g., radon, sulphur, iodine, etc., playing an important, though possibly too much disregarded, part as to the synergism of all the health resort parameters.

Examples are given to demonstrate methods and techniques applied. *Subject Headings:* **1. Health resorts 2. Climatotherapy.**—*Author's abstract.*

B6. RADIOACTIVITY

See also: **IGY artif. radioactivity meas.** (Facy), 12.9–36; **Underground nuclear explosions** (Griggs), 12.9–171.

12.9–94 551.510.721:531.52:551.574.1

†Farlow, N. H. (*U. S. Naval Radiological Defense Lab., San. Francisco*), **Atmospheric reactions of slurry droplet fallout.** *Journal of Meteorology*, Boston, 17(4):390–399, Aug. **1960.** Fig., 6 tables, 37 refs., 9 eqs. **DWB, DLC**—The evaporation, growth, and physical properties of slurry fallout particles descending through the atmosphere are quantitatively examined by application of established cloud-physics equations. An arithmetic system of analysis is proposed and applied to radioactive slurry fallout particles collected at Operation Redwing. Reasonable agreement between observed and calculated particle properties supports the validity of applying this method to other meteorological situations where volatile droplet fallout may occur. *Subject Headings:* **1. Radioactive droplet fallout 2. Operation Redwing.**—*Author's abstract.*

12.9–95 551.506.22 551.510.721

Jaworowski, Zbigniew (*Polish Acad. Scien., Warsaw*), **Radioactive fallout measurements at Hornsundfiorden in Spitsbergen.** *Acta Geophysica Polonica*, Warsaw, 7(2):130–133, **1959.** fig., table, 4 refs. Polish summary p. 133. **DWB, DLC**—The measurements of the radioactivity of rain, snow and dust, collected by means of the pot sampling method at the base of the Polish I.G.Y. Expedition at Hornsundfiorden in Spitsbergen, during Sept. 1957 and March 1958 are reported. The pot sampling method is described and the results are discussed, tabulated and graphically represented. During the period of investigations the average fallout radioactivity was about 0.2 mC/km²/day. The analysis of the peak samples' disintegration curves and of the absorption curves indicates the occurrence of a predominant quantity of Strontium 89. *Subject Headings:* **1. Radioactivity of precipitation 2. Strontium^{89} occurrences 3. Radioactivity sampling methods 4. Artificial radioactivity 5. IGY expeditions 6. Hornsundfiorden, Spitsbergen.**—*I.S.*

12.9–96 551.510.721

Keam, D. W.; Dwyer, L. J. et al. (*Commonwealth X-Ray and Radium Lab.; Director, Commwlth Bur. of Met.*), **Global fallout in Australia during 1958.** *Australian Journal of Science*, Sydney, 22(2):51–54, Aug. **1959.** fig., 3 refs., 3 tables. **DLC**—Global fallout has been monitored in Australia since Nov. 1956. After the nuclear weapons test series at Maralinga in Sept. and Oct. 1957 the Atomic Weapons Test Safety Committee continued in operation a monitoring network comprising 24 of its 86 stations. The network was chosen to give representative measurements for the regions inhabited by the majority of the Australian population. The techniques used have allowed continuous observation to be maintained at all stations. At eight major population centers air and rain water have been sampled while surface contamination has been monitored throughtout the network; each sample was measured for gross β activity. The observations complement the Committee's Australia-wide survey of ^{90}Sr in biological and other materials by giving some information on the extent of tropospheric fallout from weapon tests held overseas. Results from the first part of the program, to 31 Dec. 1957, have already been published (Keam et al., 1958), and in this note the results from 1 Jan. to 31 Dec. 1958 are presented. During this period weapon tests were held by the U. K. (Christmas Island), the U. S. A. (Marshall Islands and Nevada) and the U.S.S.R. (within Soviet territory). *Subject Headings:* **1. Radioactive fallout 2. Global radioactivity 3. Radioactivity monitoring network 4. Australia. I. Martin, J. H. II. Titterton, E. W.**—*Authors' abstract.*

12.9–97 551.510.721:541.28

Lockhart. L. B., Jr.; Baus, R. A.; Patterson, R. L., Jr. et al. (all, *U. S. Naval Res. Lab., Wash., D. C.*), **Radiochemical analyses of fission debris in the air along the 80th meridian,**

est. *Journal of Geophysical Research*, Wash., D. C., 65(6):1711–1722, June 1960. 7 figs., tables, 18 refs. **DLC**—A number of radiosotopes formed in high yield by nuclear explosions ave been determined quantitatively in the gross-fission-product conglomerate collected by r filters at sites along the 80th meridian during the IGY. Radiochemical analyses have nown that debris from two (or more) nuclear tests of the U. S. Hardtack Series in the Pacific ossed the equator. Save for the period of gross contamination in the troposphere by Hardtack debris, the average age of the fission-product conglomerate in the air has been consistently der in the southern than in the northern hemisphere. Furthermore, the Sr^{90} content of the ir has shown a general pattern of maxima in the region between latitudes 20° and 40°N and etween latitudes 20° and 40°S and a minimum in the equatorial region. During early 1958 ne maximum in the north averaged about 7 times that in the south. The rapid spread of adioactivity from the Hardtack tests (identified by the presence of W^{185}) and from Soviet uclear tests emphasizes the fact that debris is not restricted to a narrow zone near the latitude f introduction. *Subject Headings:* **1. Radioactive fallout analysis 2. Radiochemistry. Saunders, A. W., Jr,**—*Authors' abstract.*

12.9–98 551.510.721:662.2:539.1

Tauber, Henrik (*National Museum, Denmark*), **Post-bomb rise in radiocarbon activity in enmark.** *Science*, Wash., D. C., 131(3404):921–922, March 25, **1960.** fig., table, 12 refs. **DLC**—During the summers of 1958 and 1959 the increase in concentration of bomb- produced adiocarbon in Denmark was several percent higher than the average increase for the hemisphere. This additional increase is probably a carbon-14 equivalent to the spring peaks in trontium 90 fallout in the North Temperate Zone in the same years, and suggests latitudinal ariations in carbon-14 contamination. *Subject Headings:* **1. Radiocarbon activity 2. Carbon-14 contamination variations 3. Denmark.**—*Author's abstract.*

12.9–99 551.510.721:631.4

†Thornthwaite, C. W.; Mather, T. R. et al., **Investigation of the climatic and hydrologic actors affecting the redistribution of strontium-90 in the soil.** *Drexel Institute of Technology. Lab. of Climatology, Publications in Climatology*, 12(2), Sept. **1959.** p. 55–91. 8 figs., 9 tables, 2 refs. (Contract AF 49(638)-409, Technical Status Report No. 5.) **DWB** (M8 D777p)—A report of separate yet related research studies, directed toward increasing our understanding of the redistribution of strontium in the soil. Separate studies involving the chemistry of oils, the geographical distribution of cation exchange capacity, and the estimation of future etention of strontium in the soil are summarized. Based on the results of these, a mathematical model of movement downward through the soil under the action of surplus water has been developed. The model was tested against the field measurements which have been made at New York City for the past few years by the Health and Safety Laboratory and good greement between measured and computed values was obtained. The concentration of trontium in the soil was also predicted for 1958, 1959 and 1960. Due to a change in sampling ite and depth in 1958, it was not entirely possible to compare predicted and actual results. However, the technique of analysis appears to have considerable applicability. The report is extensively illustrated by tables and graphical representations. *Subject Headings:* **1. Strontium^{90} in soil 2. Soil chemistry 3. New York City, N. Y. I. Carter, D. B. II. Kulelian, D. T. III. Kupelian, R. H. IV. Nakamura, J. K.**—*I.S.*

12.9–100 551.510.721:551.577.7

Walton, A. (*Isotopes, Inc., New Jersey*), **Tungsten-185 in precipitation and the seasonal ariations in fall-out.** *Nature*, London, 188(4746):220–221, Oct. 15, **1960.** 3 figs., 8 refs. **DWB**—The deposition of tungsten-185 and strontium-90 in precipitation at Westwood, New Jersey for the period June 1958 to July 1959 is presented in graph form. The variations n deposition were considerable and were not due to differences in rainfall amounts. Two major peaks occurred in Nov.–Dec. 1958 and Spring 1959. There is good evidence for the easonal variation in fall-out as suggested by STEWART. The tungsten-185 data demonstrate hat this seasonal variation is not a result of the testing schedule but is a meteorological phenomenon. Comparing the results for strontium-90 with those for tungsten-185 which was of "Hardtack" origin suggested that only 8% of the strontium-90 was of "Hardtack" origin.

Subject Headings: **1. Fall-out 2. Radioactivity of precipitation 3. Strontium^{90} in precipitation 4. Tungsten^{185} in precipitation 5. Operation Hardtack.**—*R.B.*

B7. RADIO PROPAGATION

See also: **IGY-World Warning Bureau (URSI), 12.9–37.**

12.9–101 551.587:621.396:551.521.3:551.593.1

Misme, P., **Essai de radioclimatologie d'altitude dans le Nord de la France.** [Trial of upper-air radioclimatology in northern France.] *Annales des Télécommunications*, Paris, 13(11/12):303–310, Nov./Dec. **1958.** 13 figs., 9 refs. **DLC**—In order to facilitate computations of refraction and absorption between ground level and 20 km, the author investigates following parameters: refractive index, refractive index gradient, partial water vapor pressure, partial oxygen pressure, liquid water. For each parameter (except for the last), one gives the distribution with respect to altitude and the diurnal and seasonal changes. The study, which bears upon one year measurements (700 radiosoundings), enables to determine a scale of sizes for the radioclimatological values. There is no difference between the propagation problems within first 20 km of the atmosphere and beyond. One can however state at the first stage that seasonal diurnal and nocturnal air changes must always be taken into account from 0 up to 8 km; because mean values will generally do. Beyond 20 km certain parameters have practically no importance. *Subject Headings:* **1. Upper air radioclimatology 2. Atmospheric refraction and absorption 3. Diurnal and seasonal changes 4. Changes with altitude 5. Trappes, France.**—*A.V.*

12.9–102 551.594.18:551.58:621.396.11

Du Castel, F. and Misme, P., **Eléments de radioclimatologie.** [Principles of radioclimatology.] *L'Onde Électrique*, Paris, 37(368):1049–1052, Nov. **1957.** 9 figs., 4 refs. **DLC**—A single meteorological parameter is sought, which will account for the variations in level of the electric field in long distance links. After justifying the choice of the mean gradient of the refractive index in the lower layer of the atmosphere, a study is made of the variations deduced from routine radio-sonde observations in Western Europe and in North Africa. The conditions and limitations in use of such a parameter are discussed. *Subject Headings:* **1. Radio meteorology 2. Electrical phenomena in the atmosphere 3. Wave propagation 4. Relations to meteorological elements.**—*Authors' abstract.*

12.9–103 621.396.8:551.515.8:551.510.62

†Hay, D. R. (*Dept. Physics, Univ. Western Ontario*) and Poaps, G. E., **Frontal perturbation of a troposphere scatter path.** *Canadian Journal of Physics*, Ottawa, 37(11): 1272–1282, Nov. **1959.** 5 figs., table, 22 refs. **DWB, DLC**—A 2-yr study of 500 Mc/s radio transmissions over an 85-mile path near Ottawa has shown that the signal fading rate rises well above the diurnal maximum when the transmission path is perturbed by a weather front. The fading rate reaches a maximum when the upper boundary of the frontal zone is 3000 ft above the center of the radio path, and the fading rate remains high as long as any part of the frontal zone is between the surface and 3000 ft. A similar relationship between frontal position and signal fading rate is found for Arctic, Maritime, or Polar fronts in the Ottawa area, but the Arctic fronts provide the clearest definition. There is some indication that high fading rates also may be associated with horizontal layers of contrasting humidity at low levels in the troposphere. *Subject Headings:* **1. Signal intensity variations 2. Frontal effects on signal intensity 3. Ottawa, Canada.**—*Authors' abstract.*

12.9–104 551.501.81:551.510.62

Schuetz, John (*Illinois State Water Survey, Ill.*), **Radar-echo enhancement at frontal boundaries by refractive index inhomogeneities.** *American Meteorological Society, Bulletin*, 40(6):295–300, June **1959.** 5 figs., 9 refs., 2 eqs. **DWB, DLC**—Observations associated with some unusual radar echo lines are presented. Analysis of raingage and radar indicates that echo enhancement due to a steep refractive index gradient is occurring. Acceleration of the front may play an important role in forming this echo. Synoptic application of observations

f these unusual echo lines is discussed. *Subject Headings:* **1. Radar-echoes from atmospheric inhomogeneities 2. Refractive index inhomogeneities.**—*Author's abstract.*

12.9–105 551.501.81:551.515:551.577.2

Fujita, Testsuya and Brown, Henry A., **A study of mesosystems and their radar echoes.** *American Meteorological Society, Bulletin*, 39(10):538–554, Oct. **1958.** 14 figs., 9 refs. **DWB.** Also issued as Chicago. Univ. Dept. of Meteorology, Contract Cwb-8950, Technical Report No. 1, April **1957.** 18 p. 15 figs., 7 refs. Also included in the Final Report, Pt. 1, issued **1957. DWB** (M15 C532fi)—Five mesosystems occurring on 4 to 5 June 1953 in an area 600 by 600 mi near Chicago were analyzed with the use of data from regular synoptic stations. Four of the systems were of the well known type having a pressure-surge line, a thunderstorm high, and a wake of depression. The fifth system, a trough 500 mi in length, traveled at the rate of 60 kn. By using radar pictures taken every minute, the movement of echoes was also studied. The echo velocities, which were approximately 20 kn while a pressure-surge line was 100 mi distant, increased up to 40 kn with the approach of the line. The individual echoes in the line move in an east-northeast direction while the pressure-surge line, oriented southwest to northeast, proceeded towards the south-southeast. The centers of the mesosystems moved in the same direction as the individual echoes in the squall line. Hourly precipitation amounts accompanying each system were integrated with respect to time and 'time integrated' precipitation charts were then constructed. *Subject Headings:* **1. Radar echoes from mesosystems 2. Precipitation charts.**—*Authors' abstract.*

12.9–106 551.501.81:551.510.62

Atlas, D. (*Blue Hill Met. Obs., Milton, Mass.*), **Radar studies of meteorological "angel" echoes.** *Journal of Atmospheric and Terrestrial Physics*, N. Y., 15(3/4):262–287, Oct. **1959.** 19 figs., 30 refs., 9 eqs. **DLC**—A review, supplemented by new data, is presented of "angel" echoes from meteorological sources. The major angel types are: (a) non-stratified discrete-coherent echoes which occur randomly in the convective mixing zone, and groups of incoherent echoes associated with pre- and sub-cumulus thermals; (b) mantle echoes associated with, and in the form of, cumulus cloud boundaries; and (c) stratified echoes, generally incoherent when viewed obliquely (at large ranges), coherent at vertical incidence and associated with layers of sharp moisture lapse or minima. Such layers may also act as plane reflectors giving coherent echoes. Special angel types, such as those associated with the sea breeze front add to the impressive evidence of the association of angels with meteorologically induced gradients in refractive index. In every case, however, the gradients required by theory exceed "reasonable" or measured values by at least one or two orders of magnitude, apparently due in large part to the lack of high resolution refractometer measurements. The observations indicate frequent conditions suitable for enhanced forward scatter beyond the horizon, and also testify to the feasibility of FRIEND's 1939 proposal to use radio reflections for sounding air-mass boundaries. *Subject Headings:* **1. Angel echoes 2. Refractive index gradients.**—*Author's abstract.*

12.9–107 551.501.81:551.576.1

Sal'man, E. M., **Metodika radiolokatsionnykh issledovanii struktury kuchevodozhdevykh oblakov.** [Method of radar investigation of cumulus rainclouds] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 82:68–77, **1958.** 6 figs., 5 refs., 8 eqs. **DLC**—The author proposes a method for studying the vertical and horizontal sections of cumulus clouds and simultaneously measuring the intensity of radio echoes. The characteristic of the method is the use of a recorder of type *A* with an amplitude system for indicating reflected signals not used previously for meteorological purposes. Such recorders have a linear relationship between the magnitude of the deviation of the beam on the tube Y and the deviating voltage u_d, namely $Y = \frac{1}{2}\frac{lL}{ud}u_d$ where deviation of beam from center of screen, ud = deviating voltage, u = potential of second anode in relation to cathode, l = length of deviating plate, d = distance between deviating plates, L = distance from deviating plates to screen. The absolute value of the characteristic radio echo is obtained by measuring the deviation of the beam r on the indicator of type *A* in the presence of a preliminary calibrated receiver. The radar type SCR S45 *A*

was used for measuring vertical and horizontal sections of cumulus clouds. For this radar θ_0 (width of the diagram of the direction of the parabolic antenna) was 5° so that DR_{max} = maximum error of averaged intensity of radio echo along the width of the beam was ±1000 met and sections of cumulus rain clouds were 24000 met. The complete vertical or horizontal section was made by step-wise variation of the angle of the antenna or azimuth respectively. The measurement of the intensity of the reflected signals is described; a block diagram for measuring the intensity of the reflected signal by the method of comparison, a circuit diagram of a calibrator of sensitivity and a photograph of the latter are presented. The variation of the intensity of reflection of signals from cumulus-rain clouds in case of of known values of the parameters of radar and attenuation of electromagnetic waves within clouds enables the determination of the effective reflecting surface of unit volume from the fundamental equation of radio location of atmospheric structure: $P_r = \frac{P_t A_p^2 \theta_0^2 c\tau\eta}{72R^2\nu^2} x$ where P_t = impulse intensity, A_p = aperture of the antenna, R = distance, η = effective reflecting area of unit volume, x = coefficient taking into account attenuation. Neglecting attenuation on a 10 cm range of waves in cumulus rain clouds and applying the Rayleigh formula to this wave this equation can be written as $Z = \sum_0^N n_i r_i^6 = cP_r R^2$ where $C = \frac{6.4\lambda^6}{P_t A_p^2 \theta_0 c\tau\pi^4 \left[\frac{m^2-1}{m^2+2}\right]^2}$. Z is termed the reflectivity. The construction of the character of the distribution of reflectivity of cumulus rain clouds in vertical and horizontal planes is illustrated. *Subject Headings:* **1. Cumulus cloud structure 2. Radar echoes from clouds.**—*I.L.D.*

12.9–108 551.508.822:551.510.62:535.314

Wagner, N. K. (*Univ. Texas*), **An analysis of radiosonde effects on the measured frequency of occurrence of ducting layers.** *Journal of Geophysical Research*, Wash., D. C., 65(7): 2077–2085, July **1960.** 3 figs., table, 12 refs., 2 eqs. **DLC.** Also issued as Texas. Univ. Electrical Engineering Research Lab., Contract AF 19(604)-2249, Report 6–31, Dec. 19, **1959.** 32 p. 7 figs., 5 tables, 15 refs., 2 eqs. **DWB** (M94.7 T355r)—The influence and importance of the time-lag of the radiosonde sensing elements, data-transmission techniques, and significant-level-selection criteria on the resulting computed index of refraction profile are discussed. The quantitative importance of these radiosonde effects on the detection of ducting layers in the Southern California coastal region is determined by employing refractometer data along with known and assumed characteristics for the radiosonde. Time-lag is found to be the most important single effect, with data-transmission techniques next in importance. Significant-level criteria have a very small effect on the detection of ducting layers and when considered in combination with time-lag and data-transmission techniques are negligible. A comparison is made between the frequency of occurrence of non-standard-layer conditions obtained from refractometer and radiosonde data for this geographical region. *Subject Headings:* **1. Radio refraction index 2. Ducting layers 3. Radiosonde effects.**—*Author's abstract.*

12.9–109 551.510.62:551.510.52

Norton, Kenneth A. (*Boulder Labs., Boulder, Col.*), **Carrier-frequency dependence of the basic transmission loss in tropospheric forward scatter propagation.** *Journal of Geophysical Research*, Wash., D. C., 65(7):2029–2045, July **1960.** 8 figs., 3 tables, 19 refs., eqs. **DLC**—A further interpretation is given of certain Lincoln Laboratory data obtained in an experiment using scaled antennas as published by BOLGIANO (1959). This paper has three objectives: 1) to consider the significance of these data as regards the theory of radio propagation through a turbulent atmosphere; 2) to describe a suitable method for the measurement of the meteorological parameters entering the theory; 3) to apply a further statistical analysis to these data. On the basis of this analysis of the Lincoln Laboratory data, it is concluded 1) that the

$$\{2/\Gamma(\mu)\}(\rho/2)^{\mu} K_{\mu}(\rho)$$

correlation model provides a description of tropospheric turbulence adequate for the description of these data with μ assigned the fixed value 1, and 2) that the variation of the carrier-frequency

ependence of the basic transmission loss from hour to hour arises simply from a lack of correlation in the hourly median losses on widely separated carrier frequencies rather than from changes f μ in this correlation model. *Subject Headings:* **1. Radio propagation through the atmosphere . Tropospheric forward scatter propagation.**—*Author's abstract.*

12.9–110 551.510.41:551.464:546.264

Takahashi, Taro (*Lamont Geol. Observ. Col. Univ. N. Y.*), **Carbon dioxide in the atmosphere nd in Atlantic Ocean water.** *Journal of Geophysical Research*, 66(2):477–494, Feb. 1961. 8 figs., 6 tables, 19 refs. **DLC**—An investigation of carbon dioxide partial pressures in the tmosphere and surface ocean conducted as part of a cooperative study under the general ponsorship of the IGY is summarized. Results are given for about 470 hrs of air analyses and 200 individual surface ocean water measurements made from 1957 to 1959 between 60°N and 58°S. Over the Atlantic Ocean, the atmospheric carbon dioxide concentration is found to average 316 ppm by volume and to be quite uniform except for a minor increase toward the equator. The total carbon dioxide in the earth's atmosphere is estimated to be 2.41×10^{18} g. In the equatorial region, the partial pressure of carbon dioxide appears to be higher in the surface water than in the atmosphere; in the higher latitudes it appears to be lower. *Subject Headings:* **1. Carbon dioxide in atmosphere 2. Carbon dioxide ocean water 3. Atlantic Ocean.** —*Author's abstract.*

C. OCEANOGRAPHY, HYDROLOGY AND GLACIOLOGY

C1. OCEANOGRAPHY

See also: **Storm surge monograph—Netherlands** (K.N.M.I.), 12.9–1; **Environ. factors influencing naval weapon systems** (Woods Hole Oceanog. Inst.), 12.9–5; **Inversion over Eastern N. Pacific** (Neiburger, Johnson, et al.), 12.9–12; **Antarctic geography** (Lebedev), 12.9–21; **Generation of wave energy** (Warren), 12.9–310.

12.9–111 551.510.41:551.464:546.264

Bolin, Bert (*Univ. Stockholm*), **On the exchange of carbon dioxide between the atmosphere and the sea.** *Tellus*, Stockholm, 12(3):274–281, Aug. 1960. 2 figs., table, 18 refs., 20 eqs. **DWB**—The physical and chemical processes responsible for exchange of carbon dioxide between the atmosphere and the sea are analyzed. It is shown that the rate of transfer is considerably decreased due to the finite rate of hydration of CO_2 in water. This is the case both for a smooth water surface where molecular diffusion plays a role in the first few hundredths of a millimeter as well as for a rough sea where turbulence extends all the way to the surface. A general agreement is found between the transfer rate deduced in this way and the rate of exchange extimated on the basis of the C^{14}/C^{12} ratio in the atmosphere and the sea. *Subject Headings:* **1. Carbon exchange ocean-atmosphere.**—*Author's abstract.*

12.9–112 551.510.41:546.264

Bruevich, S. V. and Liutsarev, S. V., **O soderzhanii CO_2 v atmosfere nad Tikhim i Indiiskim okeanami i v raione Chernogo moria.** [Content of CO_2 in the atmosphere above the Pacific and Indian Oceans, and in the region of the Black Sea.] *Akademiia Nauk SSSR, Doklady*, 136(2):405–407, 1961. table, 4 refs. **DLC**—An investigation of CO_2 content in the atmosphere, made for and during the IGY (1957–58). Similar works were carried out over the oceans and maritime regions for determining the accumulation of free CO_2 in the atmosphere. The CO_2 content was usually determined with chemical method by absorption of $CO_2Ba(OH)_2$ followed by titration of the residue of barytes by hydrochloric acid. The investigation of CO_2 content, conducted on the expedition ship "Vitiaz," made at the Pacific and Indian Oceans, Black Sea (Caucasus and Crimea) and around Scandinavia are described with qualitative and quantitative details, and comparison with works of other investigators are made. *Subject Headings:* **1. Carbon dioxide in the atmosphere 2. Pacific Ocean 3. Indian Ocean.** —*N.P.S.*

12.9–113 551.510.7:551.464

Hiyama, Yoshio (*Univ. of Tokyo*), **An idea on the maximum permissible concentration of radio-active materials in sea-water.** *Records of Oceanographic Works in Japan*, 5(2):98–104, March **1960.** table, 4 refs., 9 eqs.—With regard to the maximum permissible ionizing radiation dose-rate for the human body, the International Commission on Radiological Protection (I.C.R.P.) has made recommendations not only for the exposure dose-rate but also for the total body burden, as well as the amount of daily intake through air and water for various kinds of radio-nuclides. In some countries legislation along this line to limit the total effects of radiation from various sources within the country has already been established or proposed. This kind of control can be accomplished either by monitoring the radiation level directly or by the chemical analysis and radioassay of the various materials taken in by the people of the country. Even assuming that technical developments in the disposal of waste radioactive materials in the sea could limit the amount of flow-out of these materials into the food-producing parts of the ocean to some degree, if the possibility of contamination of the food-producing areas still existed, it would be necessary for the sound and economical development of atomic energy utilization in the future to reserve a share of the total national permissible radiation dose for internal radiation exposure by radio-nuclides of marine origin. This would be particularly the case in those countries which geographically are oceanic islands, where marine products are important in the national diet and where the adjacent seas are likely to be used internationally as important places for waste disposal. The author in the present paper has tried to find a relationship between the level of sea-water contamination by several radio-nuclides and the level of radiation dose-rate inside the human body caused by these radio-nuclides of marine origin, using the recommendation of the I.C.R.P. and the few data on the chemical analysis of sea water and of the human body presently available to the author. However, even if the idea of this calculation were to be recognized by scientists in the fields of oceanography, public health, nutrition, radiation, biology, and others, it would still be necessary to get further data on the amounts of trace elements in sea water, in marine products, and in the human body in order to complete a table of the maximum permissible concentrations in sea water of various radio-nuclides. Here the idea is merely advanced and a few examples are described. *Subject Headings:* **1. Radioactive waste disposal in the sea 2. Sea water contamination.**—*Author's abstract.*

12.9–114 551.521.14:551.463

Ter-Markariants, N. E., **O srednikh dnevnykh velichinakh al'bedo moria.** [Mean diurnal values of the albedo of the sea.], *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 100:37–40, **1960.** table, 6 refs. Russian summary p. 37. **DWB**—The mean magnitude of day albedo of the sea is of great interest for climatological investigation. A number of authors have contributed to the evaluation of the phenomena and have computed the mean albedo with global radiation being constant; they considered the magnitude of albedo depending on the sun's altitude without consideration of angular distribution of scattered radiation. The back radiation due to the waves was also neglected. The results of computation of the mean magnitude of day albedo for latitudes from 30° to 70°, for different times of the yr; for cloudless sky as well as for varied states of cloudiness in the lower part of sky are considered. The computations were based on the observations made at Black and Caspian Seas. The magnitude of global radiation was taken from actinometric observations at a number of meteorological stations. The table of the magnitude of the albedo for different states of cloudiness is carried in the article, with the note that the radiation was measured at the times when waves were of scale 1 to 3 and the transparency of the sea from 8 to 12 mm. These conditions are most characteristic for the seas of SSSR. The method and formulas are given for determination of albedo for any state of the atmosphere and low or high cloudiness. *Subject Headings:* **1. Sea's albedo 2. Global radiation measurements 3. Black Sea 4. Caspian Sea.**—*B.J.G.*

12.9–115 551.465

†Arthur, Robert S., **Review of the calculation of ocean currents at the equator.** *Deep-Sea Research*, London, 6(4):287–297, June **1960.** fig., 2 tables, 27 refs., 14 eqs. **DWB, DLC**—Wind stress and horizontal pressure gradient at the equator have been used in the calculation

velocity. Various formulae are considered from the standpoint of consistency with an undercurrent. A simple relation between the east-west pressure gradient and the curvature of the velocity profile yields an undercurrent, but application is uncertain because of neglect of accelerations. The most promising formula appears to be that derived from the geostrophic approximation for zonal motion. Both friction and acceleration appear to be important in the dynamics of the Equatorial Undercurrent. *Subject Headings:* **1. Ocean currents 2. Equatorial undercurrent.**—*Author's abstract.*

12.9–116 551.556.8:551.461.2:532.593

*†Kinsman, Blair, **Surface waves at short fetches and low wind speeds: a field study.** Johns Hopkins Univ. Chesapeake Bay Institute, Contract Nonr 248(20) and Project NR 083-116, Technical Report 19, May **1960.** 3 vol. Each section repaged. Vol. 1, photos, tables, bibliog. (Ch. 7, 8 p.). Vol. 2–3, mostly tables and charts. **DWB** (551.48 J65t)—This is a study of 24 point records of surface waves made at short fetches and low windspeeds. It is found that the characteristic departure of the observed distribution of water heights from the Gaussian consists of an elevation of the positive tail, a depression of the negative tail, and a shifting of the mode toward negative values. The deformation is more pronounced for shorter fetches and lighter winds. Evidences of nonlinear interaction are found in the wave spectra, which tend to support the suggestion that a nonlinear theory of surface waves should be carried at least to third order for realistic results. It is found that for sharply peaked spectra the equilibrium range may not begin until frequencies are reached greater than three times the frequency at which the maximum power is located. *Subject Headings:* **1. Wind effects on waves 2. Surface waves.**—*Author's abstract.*

12.9–117 551.465

Bowden, K. F. (*Univ. Liverpool*), **The dynamics of flow on a submarine ridge.** *Tellus*, Stockholm, 12(4):418–426, Nov. **1960.** 3 figs., 11 refs., 29 eqs. **DLC**—The equations of motion are developed in a form appropriate to flow parallel to a uniformly sloping bottom. Some cases of two-layer flow are considered in which the flow is concentrated in the lower layer, as in the overflow over a submarine ridge. Whereas in the absence of friction such currents would tend to follow the contours of the bottom, the effect of bottom friction is to deflect the current to the downslope side of the contours. Numerical solutions show that in some cases the angle of deflection might be as large as 30°, but in most circumstances it is probably less, of the order of 5° or 10°. An indication is given of how the theory may be applied to the case of density varying continuously with depth, as in a real ocean. Some general conclusions, which are relevant to the interpretation of observational data, are drawn. *Subject Headings:* **1. Flow dynamics 2. Topographic influences on submarine currents.**—*Author's abstract.*

12.9–118 551.556.8:551.461.2

Uusitalo, S. (*Inst. of Marine Res., Helsinki*), **The numerical calculation of wind effect on sea level elevations.** *Tellus*, Stockholm, 12(4):427–435, Nov. **1960.** 6 figs., 6 refs., eqs. **DLC**—An iteration method has been developed which used finite differences for calculating water level elevation and water transport. To this end, the equations of motion were integrated over the depth and transformed into an implicit difference equation system. The equations were solved by the aid of an electronic computer. Two main cases were calculated, and in one instance the water levels were checked with the real ones. *Subject Headings:* **1. Wind effects on sea level 2. Sea level variations.**—*Author's abstract.*

C2. HYDROLOGY

See also: **Hydrometeorology,** 12.9–407 to 12.9–415; **Hydrophotography** (Sivadjian), 12.9–281; **Evapotrans. data** (Valken), 12.9–367; **Precip.—Lake Michigan Islands** (Blust, DeCooke), 12.9–382; **Snow distrib. and melt—Maritime U.S.S.R.** (Uryvaev), 12.9–403.

12.9–119 551.579:551.482.214(282.252)

Fedoreĭ, V. G., **Obshchaia gidrokhimicheskaia kharakteristika rek basseina Amura.** [General hydrochemical characteristics of rivers in the Amur Basin.] *Dal'nevostochnyĭ*

Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy, No. 8:85–93, **1959.** 2 figs., 6 tables, 6 refs. **DWB**—The hydrochemical characteristics of the Amur River and of its main tributaries are presented on the basis of 551 analyses of water samples for 1940–1952. Around the year observations on a series of rivers showed that the interannual variation of mineralization of river waters is relatively slight. Mineralization in general varies inversely as the amount of water discharge. Spring floods bring about a decrease in mineralization which at that time amounts to 20–60 mg/l on the middle and lower Amur area 40–70 mg/l on the upper tributaries. During the entire summer the floods maintain a not very high mineralization, within 40–50 mg/l. During the interflood period the mineralization of the Amur River is rarely above 100 mg/l. The ionic constituents are diminuted by HCO_3 which rarely drops below 25%. The average composition of the river waters of the Amur Basin is characterized by an ion content that is usual for poorly mineralized water—HCO_3 and Ca^{++} ions. During the summer as well as winter, there is no apparent relationship between variations of water discharges and their mineral content. Of considerable significance in the hydrochemical studies of rivers in the relationship between the content of individual ions and the total mineralization of waters, Σi. The relationship of Σi and the content of HCO_3 ions for river waters of the Amur Basin can be expressed by a first degree equation $x=ay+b$. Equations for individual rivers giving the relationship of $\Sigma i=f(HCO_3)$ and $\Sigma i=f(Ca^{++})$ are presented. The dissolved CO_2 content of the rivers is presented in tables. *Subject Headings:* **1. River hydrology 2. Hydrochemical observations 3. Amur River, U.S.S.R.**—*I.L.D.*

12.9–120 551.482.214(282.244.3)

Gherardelli, Luigi and Canali, Lamberto, **Enquête sur les caractéristiques chimiques et physico-chimiques des eaux du Po a Polesella et recherche des matières dissoutes dans l'eau au moyen d'analyses chimiques quantitatives et spectrographiques semi-quantitatives.** [Investigation of the chemical and physico-chemical characteristics of water of the Po River at Polesella and the examination of dissolved matter in the water by quantitative chemical and semiquantitative spectrographic methods.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Bulletin*, No. 19:24–36, Sept. **1960.** fig., tables. **DWB, DLC**—This report consists mainly of tabulated data on the chemical, physico-chemical, and spectrographic analyses of the water of the Po River. A brief discussion of the results follows the data. It is concluded that the quality of the water is satisfactory for table use and also for irrigation. *Subject Headings:* **1. Water analysis 2. River water analyses.**—*E.Z.S.*

12.9–121 551.579:551.482.2(510)

Shi, Cheng-hsi, **Opyt klassifikatsii rek Kitaĭskoĭ Narodnoĭ Respubliki.** [Attempt at a classification of rivers in the Chinese People's Republic.] *Vsesoiuznyĭ Gidrologicheskiĭ S'ezd, 3rd Oct. 1957, Trudy*, Vol. 7, issued **1959.** p. 22–32. 16 figs., table. **DWB** (M79 V985tr)—China has around 50,000 rivers with basins exceeding 100 sq. km. The absolute majority are fed by surface water and they can be divided into three types: I. rain-fed; II. snow-rain; III. snow-glacier. Each type is subdivided into regional subtypes on basis of three characteristics: 1) calendar timing of maximum and minimum average monthly discharge; 2) calendar timing of maximum and minimum trimestrial volume of runoff; 3) distribution of volume of annual runoff in months. A chart of regions of different types and subtypes, hydrographs of 15 rivers representing typical subtypes and a table of monthly distribution of annual runoff for 15 rivers of I and II types are given. *Subject Headings:* **1. River classification 2. China.**—*J.N.*

12.9–122 551.579:061.1(510)

Sokolov, A. A., **Razivitie gidrologii v Kitaĭskoi Narodnoĭ Respublike.** [Development of hydrology in the People's Republic of China.] *Meteorologiia i Gidrologiia*, Moscow, No. 9:46–49, Sept. **1959. DWB, DLC**—After a brief account of the hydraulic achievements, and of the development of irrigation and flood control in past ages in China, the author summarizes the development of hydrology in mainland China since the Chinese People's Republic was established. The construction of dams and reservoirs, the development of the hydrological network, special networks for studying evaporation, runoff, etc., the development of instrumentation, of theoretical and of empirical formulas, of new publications and the special research

rojects being either carried out or planned are discussed. *Subject Headings:* **1. Progress in ydrology 2. Chinese hydrology 3. China.**—*I.L.D.*

12.9–123 551.579

Valek, Zd. (*Chécoslovaquie*), **Beitrag zur hydrologischen und hydrotechnischen Verwendbarkeit der Holzarten.** [Contribution to the hydrological and hydrotechnical usability of various types of forests.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Publication* No. 48:322–340, **1959.** 5 figs. German and French summaries p. 322. **DWB** (M79 I611co)—Results of 28 yrs of precipitation and runoff measurements made in two small basins are reported. One of the basins (Kychová near Huslen-Ky, Vsetin district, Czechoslovakia, area 4.27 km²) was wooded, the other (Zdechovka near Zdechov, Vsetin district, 4.09 km²) under farm cultivation. A comparison of the data definitely establishes the favorable influence of woods in reducing precipitation runoff intensity and in retaining moisture during dry periods. The strengthening of river banks by various types of trees was also studied. Several tree types were found to be useful not only by preventing soil erosion but by fulfulling other functions which could not be achieved by artificial construction, such as reducing evaporation, preserving moisture, promoting rainwater infiltration and draining excess moisture. *Subject Headings:* **1. Runoff control by trees 2. Vsetin, Czechoslovakia.**—*G.T.*

12.9–124 551.579.2

†*Garstka, W. U. (*U. S. Bur. of Reclamation*); Love, L. D.; Goodell, B. C. (*both U. S. Forest Service*) and Bertle, F. A. (*Bur. of Reclam.*), **Factors affecting snowmelt and streamflow: report on the 1946–53 Cooperative Snow Investigations at the Fraser Experimental Forest, Fraser, Colo.** U. S. Govt. Print. Off., **1958.** 189 p. 136 figs. (incl. photos.), 58 tables, 104 refs., eqs. "The U. S. Bureau of Reclamation and the Forest Service collaborated in these investigations." **DWB**—The purpose of these field investigations (1946–1953) was to measure the total winter precipitation, determine the water equivalent of snow storage in a drainage basin, its areal distribution and melting, further to develop new and improved methods of forecasting snow melt runoff, involving control of heat availability. After briefly reviewing earlier work and describing pertinent features of the experimental field, the results which are presented in graphs and tables are discussed in the following order: (1) interpretation of commonly available maximum and minimum temperatures in terms of degree days; (2) Seasonal storage precipitation gages; (3) Snow disappearance; (4) Recession analyses; (5) Analyses of snowmelt hydrograph; (6) Relating snowmelt runoff to its causes; (7) Evaporation; (8) Synthesis of the snowmelt hydrograph; (9) Snowmelt runoff from Fool Creek. The detailed discussion of instrumental operation and techniques is given in the appendix, the second part is devoted to the basic data gathered in the field. *Subject Headings:* **1. Snow melt runoff 2. Stream flow 3. Fraser, Colo.**—*W.N.*

12.9–125 551.501:551.579.2:551.437 551.509.329:551.579.4

Lebedeva, N. D., **Raschet snegotaianiia i metod kratkosrochnogo prognoza daty nastupleniia maksimal'nogo urovnia polovod'ia na r. Kame.** [Calculation of snow melt and a method of short-range forecasting the date of the occurrence of the peak flood on the Kama River.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy,* No. 94:15–33, **1959.** 4 figs., 4 tables+3, 3 refs., 4 eqs. **DWB**—The yield of melting snow in a catchment basin is calculated on the basis of concepts and formulas developed by V. D. Komarov (*Ibid.*, No. 4(31)1947 and No. 6(33) 1947). The formulas for computing the volume of melt water formed in 24 hrs, the rate of snow melting in open fields and forests and nomograms for determining the yield of water from snow melting in a catchment basin are presented. In order to determine the amount of water yield as a function of snow supplies for the Kama River, the author proceeded from the conditions that (1) the termination of water yield coincides with the end of snow melting; (2) water yield is proportional to the sum of positive temperatures; (3) water retention capacity of snow β is retarded with respect to beginning of snow melting. The total yield of a field is given by $\alpha/t=6.25(1-l)(P/t)$, where P=snow cover over field and forest, $l=(F_{fo}/F_o)$, (F_o=total area of basin, F_{fo}=forest area); for a forest $\alpha_{fo}=2.86\,lP_{fo}$. The yield of water to the catchment basin from snow melt is given by $h=(1.25_{\alpha fi}+1.43_{\alpha f})t$. The results of daily

calculations of water yield over a 33-yr period for the basin of the Kama River up to Sokol'nyi Gor and for the individual basins Kama to Perus, Belaia and Vetka are analyzed with the aid of graphs showing the relationship of dates of peaks of flood waters to dates of maximum yield of melt water in the catchment basins and scenes of positive air temperatures for the subsequent 5-day period. Tables giving computation of area of water yield in forest and field, computations of water yield from melting snow on the catchment basin of the Kama River in 1949 are presented. *Subject Headings:* **1. Shortrange flood forecasting 2. Snow melt calculations 3. Kama River, U.S.S.R.**—*I.L.D.*

12.9–126 551.579.2:551.437

Vol'ftsun, I. B. and Krestovskiĭ, O. I., **Eksperimental'noe izuchenie transformatsii stoka talykh vod makroponizheniiami na logakh VNIGL.** [Experimental study on the transformation of meltwater runoff by macrodepressions at gaging stations of the VNIGL.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy,* No. 76:55–66, **1960.** 4 figs., 2 tables, 2 charts, 4 refs., 3 eqs. **DWB**—In this study of the quantitative and qualitative evaluation of the transformations of the flow of meltwater from slopes by flowing and draining macrodepressions [marshy areas and meadows larger than 100 km²] on the surface of a basin, the authors attempt to compute that 24-hr runoff layer of two meadows during the spring flood water which would take place in the absence of macrodepressions on the surface of the basin. By means of the equation $W_{1+2} = W - W_3 - W_4 \pm W_{ac}$ it is possible to compute for each 24 hr period the total nonregulated volume of runoff arriving from the slope of a catchment basin; (W = 24 hr volume of flow of water stream, W_{ac} = total volume of water accumulated during 24 hrs in the depressions and W_3 volume of water formed as a result of water yield of snow immediately in the depression and W_4 = volume of water formed immediately in the depressions as a result of liquid precipitation). The amount of water immediately formed in depressions as a result of snow melt and liquid precipitation and flowing through a gage of a meadow (W_p) calculated by the equation $W_p = W_m + W_s + W_{ac}$ where W_m = volume of runoff of a meadow during the period of spring flood water. W_s = volume of runoff from slopes of the meadow during the same period and W_{ac} = volume of water accumulated in depressions at the end of the period examined. The relevant data are presented in tables and graphs. *Subject Heading:* **1. Runoff calculations.**—*I.L.D.*

12.9–127 551.579.4:551.577.31:551.482.2(479.22)

*Murvanidze, V. A., **Maksimal'nyĭ dozhdevoĭ stok rek Zapadnoĭ Gruzii.** [Maximum runoff of rivers in Western Georgia.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy,* No. 73:146–189, **1960.** 10 figs., 18 tables, 13 refs., 43 eqs. Russian summary p. 189. **DWB**—This paper is a comprehensive information of the problems involved in the analysis and computation of 24-hr precipitation, of the layer of flood runoff, of maximum discharges and of the hydrographs of rain floods in Western Georgia (U.S.S.R.). The contents of this study include the following: calculation of 24 rainfall of varying frequencies; the maximum mean intensity and layer of precipitation for different intervals of time over the territory of Western Georgia; calculation of totals of rainfall runoff from data of hydrometric observations, 24-hr precipitation; calculation of maximum discharges of rainfall floods; determination of maximum discharges of water by means of the formulas of D. L. Sokolovskii, G. A. Alekseer and J. J. Kherkheulidze and improvement of the accuracy of determining computation parameters; and construction of computation hydrograph of rain floods. The relevant equations are developed; the results of calculations are presented on tables and graphs; maps showing the layer of rainfall in 24 hrs, occurring one time in 100 yrs, layer of flood runoff occurring one time in 100 yrs, etc. are given. *Subject Headings:* **1. River runoff maximums 2. Rainfall calculations 3. Rainfall runoff 4. Rain flood hydrograph 5. Western Georgia, Georgian S.S.R.**—*I.L.D.*

12.9–128 551.515:551.579.4:551.437

Newton, Donald W. (*Flood Control Branch, TVA, Tennessee*), **Storms and floods on small areas.** *Journal of Geophysical Research,* Wash., D. C., 65(7):2117–2123, July **1960.** 7 figs., 3 refs. **DLC**—A complete analysis of the flood potential of a watershed must include an estimate of the maximum expected flood discharge. A simplified easily applied procedure for

as of up to approximately 500 sq mi is outlined. The procedure is based upon a determination of the maximum expected storm. Storm transposition techniques and information published by the U. S. Weather Bureau and the Corps of Engineers are used in making this determination. A basic family of depth-area- duration curves is found, by use of relationships developed by the U. S. Weather Bureau and reported in *Hydrometeorological Report 33*, to develop observed storms in a meteorologically homogeneous region. These basic data are further adjusted to conform to the moisture potential of the watershed in question. Standard techniques are used to compute the precipitation exess and the flood hydrograph. Support for this technique for computing both storms and floods in the Tennessee Valley area is found in observed events in the region. *Subject Headings:* **1. Flood potential of watersheds 2. Flood hydrographs 3. Tennessee Valley.**—*Author's abstract.*

12.9–129 551.482:551.579.4

Stoker, J. J. (*Inst. of Mathematical Sciences, N. Y. Univ.*), **Numerical solution of flood wave and river regulation problems.** *American Philosophical Society, Proceedings*, 103(4): 328–553, Aug. 15, 1959. 12 figs., 8 refs. **DWB, DLC**—The present paper aims to describe a scientific investigation referring to the numerical calculation of flows in large rivers and reservoirs. Three test cases were selected with the object of comparing the observed flood stages with those computed numerically. In each case the state of the river or river system was taken at the beginning of the flood period, i.e., the river depths and velocities were assumed known everywhere at some arbitrary selected initial time. For subsequent times the inflow from tributaries and the local runoff in the main valley were taken from the actual record, and the progress of the flood in the main stream was then computed for future times of the order of weeks. The flood stages, that is, the heights of the river surface above sea level, as determined numerically were then compared with those actually observed along the river. The results, as graphically shown (Fig. 1), were found to be very satisfactory. Later, follows a brief discussion in general terms of what is involved in making numerical calculations of flows in large rivers. It is concluded that the combination of knowledge of various mathematical techniques, partly concerning the theory of partial differential equations and partly concerning relatively recent discoveries in numerical analysis, together with adequate computing machines has led to the successful solution of problems of a type which are of considerable importance from practical points of view. *Subject Headings:* **1. Flood forecasting techniques 2. River flow.**—*I.S.*

12.9–130 551.573:551.577:551.579.5

Howe, G. Melvyn (*University College of Wales, Aberystwyth*), **The water balance in upland Wales.** *Wales, University College, Aberystwyth, Memorandum* No. 3:15–22, Nov. **1960.** 3 figs., 22 refs.—In this article, the author examines in turn the individual components of the water balance equation i.e. rainfall, run-off, evaporation, transpiration and changes in soil moisture and ground water storage. In a normal year in the Welsh uplands the average rainfall is 61.1 in. Of this some 69–70% goes as run-off (i.e. is a potential supply for domestic and industrial uses), 20–21% is lost through evaporation and transpiration and 9–10% is added to the ground water supply. In dry years a greater proportion is lost in transpiration and evaporation and only 50–55% is available as run off. Even this smaller quantity is adequate for the needs of Wales and a surplus water supply would always be available. *Subject Headings:* **1. Water supply 2. Rainfall 3. Water balance 4. Wales.**—*R.B.*

12.9–131 551.579.5

Koitzsch, R. and Kullmann, A., **Ein Beitrag zur Schätzung der Bodenfeuchtigkeit aus meteorologischen Daten.** [Contribution to the computation of soil moisture content from meteorological data.] *Angewandte Meteorologie*, Berlin, 4(1):16–22, Dec. **1960.** 4 figs., 1 refs., 12 eqs. German and English summaries p. 16. **DLC**—For the estimation of the rate of soil moisture in summer of the surface layer of a loamy sand an approximation formula has been derived from the water balance equation into which are introduced as variable quantities the logarithm of the precipitation height which is increased by 1, and the mean temperature of the seven days prior to the sampling. The constants of this formula have been computed

from 1955 to 1958 soil moisture measurements of a grass plot. This formula is used to estimate the soil moisture of another plot (fodder-plants) in 1954; the results are compared with the measured values. It follows that the estimated values may be an indication of the changes of soil moisture during summer, the constants, however, being dependent on the respective location. The relation of measured values to soil moisture may, as shown by two cases, as well be found by an estimation of meteorological data which, however, bears no such close relation. *Subject Heading:* **1. Soil moisture computation methods.**—*Author's abstract.*

C3. GLACIOLOGY AND ICE

See also: **Turb. heat exchange: ice atmos.** (Doronin), 12.9–25; **Ice Atlas-North American Arctic** (Swithinbank), 12.9–23.

12.9–132 91.04(984)551.324(984.81)

Büdel, Julius (*Geograph. Inst. der Univer. Würzburg*), **Gletscherfragen: aus dem Arbeitsprogramm der Deutschen Spitzbergen-Expedition 1959/60.** [Glacier problems: the program of activities of the German Spitsbergen Expedition 1959/60.] *Die Umschau*, Frankfurt a.M., 60(8):225–228, April 15, **1960.** Port., 3 figs., 3 foot-refs. **DLC**—A report on the work program of the German Spitsbergen Expedition 1959/1960. The results of geomorphic studies on Barents and Edge Islands are discussed. Emphasis is placed on studies of permafrost and polar glaciers. Comparison with Alpine glaciers are made and preparations for the Stauferland Expedition of June–Aug. 1960 are outlined. One of the questions to be worked on will be methods of determining snow limits in polar regions. *Subject Headings:* **1. German Spitsbergen Expedition, 1959–1960 2. Stauferland Expedition 3. Glacial investigations 4. Permafrost 5. Snow limits in polar regions 6. Barents Island 7. Edge Island.**—*E.Z.S.*

12.9–133 551.324:551.43

Odell, N. E., **The mountains and glaciers of New Zealand.** *Journal of Glaciology*, London, 3(28):739–744, Oct. **1960.** fig., 5 photos., 10 refs. Appended note by F. E. Bowen. **DWB, DLC**—This is a shortened form of a lecture delivered to the British Glaciological Society on Feb. 20, 1959. An outline was first given of the principle topographical features and geological formations of the country with particular reference to the greater mountain ranges. The structure and possible history of the country's glaciers are discussed. The progress of research on New Zealand glaciers particularly on the Tasman and Franz Josef Glaciers is sketched. The note by F. E. Bowen added later outlines the history of the fluctuations of the Franz Josef Glacier. *Subject Headings:* **1. Glaciers 2. New Zealand.**—*R.B.*

12.9–134 551.326.62(99)

Thiel, Edward (*School of Mines and Metallurgy, Univ. of Minnesota*) and Ostenso, Ned A. (*Geophysical and Polar Research Center, Univ. of Wisconsin*), **The contact of the Ross Ice Shelf with the continental ice sheet, Antarctica.** *Journal of Glaciology*, London, 3(29):823–832, March **1961.** 7 figs., 12 refs. French and German summaries p. 823. **DWB, DLC**—A profile of ice thickness along the 647 mile trail from Little America V to Byrd Station has been obtained from altimetric, seismic, and gravity measurements, and detailed studies made at the junction of the Ross Ice Shelf and the Marie Byrd Land plateau. The surface elevation profile clearly shows the depression characteristic of this contact. The thickness of the floating ice shelf has been determined from the elevations assuming hydrostatic equilibrium; for this purpose the accurately known density-depth relationship obtained from a deep borehole at Little America V was employed. The buried rock topography at the contact has been deduced from a seismic sounding and variations in the gravity anomaly. Movements studies over a 21 month period are presented, and the crevasse pattern of the contact is analyzed in terms of ice movement. Suggestion are given for traversing the region by vehicle. *Subject Headings:* **1. Ross Ice Shelf 2. Continental Ice Sheet, Antarctica.**—*Authors' abstract.*

12.9–135 551.324.5/83(236.7)

Humphries, D. W. (*Dep. of Geology, Univ. of Sheffield*), **Preliminary notes on the glaciology of Kilimanjaro.** *Journal of Glaciology*, London, 3(26):475–482, Oct. 1959. 8 photos, 2 refs.

nglish, French and German summaries p. 475. **DWB, DLC**—Glaciological studies during he Sheffield University Expeditions to Kilimanjaro in 1953 and 1957 included a survey of the ciers and a close examination of the Penck Glacier and the stagnant remnants of the ice p on the summit. The Penck Glacier has done little downcutting although it rests on friable ck. The glaciers and summit remnants are rapidly retreating, the Penck Glacier having treated 3 m in 3 months in 1957, and nearly 300 m since 1912. The main accumulation zone pears to be at about 4500–5000 m with a local "low level" firn line and an upper firn line ove the top of the mountain. Maps of the glaciers, their recent fluctuations and moraines e being prepared. The glaciological and meteorological observations in 1957 from part the I.G.Y. program for East Africa. *Subject Headings:* **1. Glaciology observations Glaciers 3. Penck glacier 4. British participation in IGY 5. Kilimanjaro, Tanganyika.**—*uthor's abstract.*

12.9–136 551.324.63

Dineley, D. L. (*Dept. of Geology, Univ. of Ottawa*) and Waters, R. S. (*Department of ography, Exeter University*), **Notes on the recent advance and retreat of Sefströmbreen in kmanfjorden, Vestspitsbergen.** *Journal of Glaciology*, London, 3(28):693–697, Oct. 1960. figs., 8 refs. **DWB, DLC**—These notes are based on observations made in 1958 while the riters were members of the Birmingham and Exeter Universities Spitsbergen Expedition. he position of the ice front in 1958 is compared with that recorded on five previous occasions etween 1882 and 1936. A rapid 6 km advance at the end of the nineteenth century has been llowed by a slower but equally extensive retreat. A revision of the limit of maximum advance based on geomorphological evidence. Reasons are suggested for the relatively small changes the outline of the ice front since 1927, and the effects of spells of moderately high atmospheric ressure are noted. *Subject Headings:* **1. Glacial advances 2. Glacier retreat 3. Spitsbergen.** *-Author's abstract.*

12.9–137 551.324.63:551.583

†Nye, J. F. (*California Institute of Technology*), **The response of glaciers and ice-sheets to easonal and climatic changes.** *Royal Society of London, Proceedings, Ser. A*, 256(1287): 59–584, July 19, **1960.** 7 figs., 25 refs., 2 apps., 66 eqs. **DWB, DLC** (Q41.L7)—A glacier is reated as an essentially one-dimensional flow system, which is, continuously along its length, ther gaining new material by snowfall or losing it by melting and evaporation. The flow at ach point, i.e. the volume passing a given point per unit time, is assumed to be a function of he thickness and surface slope. It is then shown that a region of uniform longitudinal com-ressive strain-rate is temporarily unstable. Lighthill & Whitham's theory of kinematic aves is applied to study the response of a simple model to a sudden change in rate of accumula-on (snowfall). All parts of the glacier thicken, but the lower parts thicken unstably until a inematic wave arrives to restore stability. The thickening of the lower parts, and the advance f the glacier can be very great for only a small change in accumulation; the analysis thus xplains why glaciers are such sensitive indicators of climate. The velocity and diffusion of inematic waves is discussed; they travel at 2 to 5 times the surface speed of the ice. Any part f a glacier or ice-sheet has a characteristic response time to changes in accumulation, about 000 yr for the Antarctic ice-sheet as a whole, and 3 to 30 yr for a typical glacier. The ampli-ude and phase of the response of a simple glacier to high frequency (seasonal) and ow-frequency (climatic) periodic changes in accumulation is calculated. (The periodic hanges in accumulation are the Fourier components of the complicated variation that actually ccurs.) The upper part behaves in a simple way; the lower part, on the other hand, shows ot only a direct response, but also a delayed response due to the arrival of kinematic waves rom the upper part. The two components interfere and give wide scope for variation in ehavior from one glacier to another. A further instability, discussed by BODVARSSON, which rises from an increase of accumulation with altitude, is included in the theory. It is also hown how the theory is to be applied in a valley of changing width to calculate the develop-nent of any disturbance produced by climatic change. Thus the theory enables one to alculate, in principle, the response of any glacier to any climatic change. *Subject Heading:* **. Climatic effects on glaciers.**—*Author's abstract.*

12.9–138 551.324.63

Paterson, W. S. B. (*Dept. of Geophysics, Univ. of British Columbia, Vancouver*), **Movement of the Sefstrøms Gletscher, north-east Greenland.** *Journal of Glaciology*, London, 3(29) 845–849, March **1961.** 5 figs., 3 tables, 3 refs. French and German summaries p. 845 **DWB, DLC**—Weekly observations were made on the horizontal and vertical components of surface movement of the Sefstrøms Gletscher, north-east Greenland. It is concluded that in the area in question the state of the glacier is concistent with Nye's concept of extending flow. Melting observations were also made. An estimate of ice thickness, derived from measurements of surface slope, is given. *Subject Headings:* **1. Glacier movements 2. Sefstrøms Glacier 3. North-east Greenland.**—*Author's abstract.*

12.9–139 551.583.3 :551.324.63 (485)

Wallen, C. C. (*Dept. of Geog., Univ. of Stockholm*), **The Karsa glacier and its relation to the climate of the Torne Träsk region.** *Geografiska Annaler*, Stockholm, 41(4) :236–244, 1959 6 figs., 5 tables, 8 refs. **DLC**—The Karsa Glacier has shown a remarkable retreat and thinning in recent years in conjunction with the considerably milder climate that prevailed during the early decades of this century. The considerably lower summer temperature during the 1950's points to an important change in the climatic trend during recent years. Calculated ablation amounts during the 1950's are compared with earlier conditions. The rapid retreat of Karsa in the last six yrs must be due to causes similar to those which created the considerable retreat in earlier decades. These causes have been thought to be a considerable heat supply conveyed to the glacier by convectional and condensational processes during a quite long ablation season. Although the ablation season has slightly decreased and also the heat supply from the air, the total energy has been enough to give rise to a considerable retreat of the glacier, probably due to the smaller area of the glacier in the recent decade than during the 30's. The increase of the number of cases of temperature above the freezing point during the accumulation season may be an additional factor. *Subject Headings:* **1. Glacier retreat 2. Climatic change 3. Torne Träsk region, Sweden.**—*E.Z.S.*

12.9–140 551.324.6

Wilson, Charles R. (*Geophysical Inst., Univ. of Alaska*) and Crary, A. P. (*Arctic Institute of North America, New York*), **Ice movement studies on the Skelton Glacier.** *Journal of Glaciology*, London, 3(29) :873–878, March **1961.** 4 figs., 2 refs. English, French and German summaries p. 873. **DWB, DLC**—The volume of ice that flows annually from the Skelton Glacier on the west side of the Ross Ice Shelf between the Worcester and Royal Society Range was determined during 1958–59 traverse operations to be approximately 791×10^6 m^3 or 712×10^6 m^3 water equivalent. Annual accumulation on the Skelton névé field and small cirque glaciers is estimated to be 1018×10^6 m^3 water equivalent, but this figure can be reduced to 712×10^6 m^3 by assuming that 30% of the expected accumulation in the lower slopes of the glacier is lost to adjacent areas of the Ross Ice Shelf by katabatic winds. It is evident that little or no contribution to the nourishment of the Skelton Glacier comes from the high plateau area of East Antarctica. It is suggested that this condition exists generally in the western Ross Sea and Ross Shelf area, and is responsible for the existence of the present "dry" valleys in the McMurdo Sound area. Some estimates of local ice regime are made at two sites on the glacier where ice thickness and strain are known. *Subject Headings:* **1. Glacier movement 2. Skelton Glacier, Antarctica.**—*Author's abstract.*

12.9–141 543 :546.21 :546.264 :551.326

Hemmingsen, Edward (*Univ. of Olso*), **Permeation of gases through ice.** *Tellus*, Stockholm, 11(3) :355–359, Aug. **1959.** 2 figs., table, 9 refs. **DLC**—The permeation rate of carbon dioxide and oxygen through ice has been determined at several temperatures. At −9.5°C the carbon dioxide permeation constant was found to be 0.7×10^{-11} cm^2 sec^{-1} atm^{-1}, which is about two million times less than in water. The permeation increased hyperbolically towards 0°C. No permeation of oxygen through the ice could be detected. It is concluded that the gas penetrates the ice through intercrystalline brine films rather than through the ice crystals. *Subject Headings:* **1. Ice properties 2. Ice permeation by gas.**—*Author's abstract.*

D. SOLID EARTH GEOPHYSICS

D1. GENERAL GEOPHYSICS—GEODESY

See also: **U.S.A.F. Georgetown Univ. Solar Eclipse Project** (Georgetown U.), 12.9–182.

12.9–142 550.3:551.33(44)

Jobert, G. (*Univ. Paris*), **Current research in geophysics in France.** *Geophysical Journal*, London, 3(2):272–277, June 1960. 16 refs. **DWB, DLC**—A brief report on the principal geophysical research undertaken in France from 1955 and results obtained in the field of the physics of the earth's interior. Gravity, seismology, terrestrial magnetism, glaciology, and a variety of other geophysical studies are referred to in this report. *Subject Headings:* **1. Geophysical research 2. Gravity studies 3. Seismology studies 4. Terrestrial magnetism studies 5. Glaciology studies 6. Geochronology.**—*E.Z.S.*

12.9–143 550.3:551.24

Wilson, John Tuzo, **Geofizika i rost kontinentov.** [Geophysics and continental growth.] *Priroda*, Moscow, No. 8:41–52, Aug. 1959. 8 figs. **DLC**—A paper on the theory of the earth's structure and mountain formation (orogeny) by the President of the International Geophysical and Geodetic Union. The paper is devoted to one of the most essential problems of the geological theory in which there still is no established point of view. In this paper, the author uses in equal measure geological and geophysical material which is very important as the role of geophysical data is of great import in the solution of such problems. *Subject Headings:* **1. Geophysics 2. Continent formation 3. Orogeny.**—*A.M.P.*

12.9–144 525.34:551.521.67:550.385

†Schatzman, Evry, **Sur le nouveau régime de rotation de la terre établi en juillet 1959.** [The new regime of the rotation of the Earth established in July 1959.] *Annales de Géophysique*, Paris, 16(4):495–506, Oct./Dec. 1960. 12 refs., 21 eqs. French, English, and Russian summaries p. 495. Also issued in *Académie des Sciences, Paris, Comptes Rendus*, 250(15):2680–2682, April 11, 1960. 6 refs. **DLC**—The change of angular momentum of the Earth in July 1959, as found by DANJON, is of the order of $6 \cdot 10^{32}$ g·cm²·sec⁻¹. Several physical phenomena which could possibly lead to such a change of angular momentum are considered. None of these phenomena being acceptable, the capture of solar protons by the Earth's magnetic field is considered. However, the Earth's magnetic field is not strong enough for the capture at large distance of the Earth (60 earth's radii) to occur. The reinforcement of the Earth's magnetic field by the successive formation of two ring currents would allow the capture of a third ring current, at a distance of 100 earth's radii. The angular momentum of that ring would be of the right order of magnitude. However, to reach such a result, it is necessary to suppose that the electric currents are of an exceptionally large intensity. Moreover, the transfer of that angular momentum of the solid Earth is impossible through the magnetic field, and extremely difficult to achieve through viscous friction. Still, the surface wind seems to be too large. *Subject Headings:* **1. Earth's rotation perturbations 2. Solar corpuscular influences on geomagnetic field 3. Annular earth currents.**—*Author's abstract.*

12.9–145 551.543:525.3

Sekiguchi, Naosuke (*Tokyo Astronomical Obs.*), **On the acceleration of the earth's rotation caused by the atmospheric oscillation.** *Astronomical Society of Japan, Tokyo, Publications*, 11(1):1–8, 1959. 2 figs., 9 refs., 41 eqs. **DLC**—The rate of increment of the earth's rotational energy by the atmospheric oscillation was determined as 2.06×10^{18} erg/sec, using the same data used by HOLMBERG, from which it can hardly be concluded that the acceleration of the earth's rotational velocity compensates its deceleration caused by the tidal friction. *Subject Headings:* **1. Rotation of the earth 2. Atmospheric oscillations.**—*Author's abstract.*

12.9–146 529.1:525.6:525.35

Woolard, Edgar W. (*U. S. Naval Obs., Wash., D. C.*), **Inequalities in mean solar time from tidal variations in the rotation of the earth.** *Astronomical Journal*, New Haven, Conn.,

64(4):140–142, May 1959. Table, 3 refs., several eqs. **DLC**—The deformation of the earth by the luni-solar tide-generating forces alters the moments of inertia of the earth and thereby causes periodic variations in the rate of rotation, which introduce inequalities in the measure of time determined by the rotation. The cumulative effects of the larger long period components with periods up to one year have been detected by observation with the aid of accurate clocks. In this paper, all long-period inequalities with amplitudes as great as 0.10 millisecond are computed, and are listed in Table I. *Subject Headings:* **1. Rotation of the earth 2. Time measurement techniques.**—*Author's abstract.*

12.9–147 523.78:526.6

Dambara, Takeshi (*Geophysical Survey Institute*), **The locality of the geodetic coordinate derived from the obscurity of the solar eclipse.** *Japan. Geographical Survey Institute Bulletin*, 6(1):1–11, March 1960. fig., 3 tables, 13 refs., 22 eqs. **DWB**—The method developed in this paper makes it possible to determine absolute position of continent, or island on the world-wide ellipsoid. If we measure the "obscurity of a solar eclipse" at a point on a certain geodetic coordinate system, the locality of the system will appear as the difference between observed and calculated obscurity, where the observed refers to the world-wide ellipsoid and the calculated refers to the local geodetic system. Calculations were carried out for the data of the annual eclipse at Rebun Island in Hokkaido on May 9, 1948. Corrections for the Japanese geodetic system were obtained. The values obtained are consistent with those derived by other methods. *Subject Headings:* **1. Geodetic coordinate determinations 2. Solar eclipse obscurity calculations 3. Rebun Island, Hokkaido.**—*E.Z.S.*

12.9–148 526.1

Munk, Walter H. (*Scripps Inst. of Oceanog., Calif.*), **Remarks concerning the present position of the pole.** *Geophysica*, Helsinki, 6(3/4):335–355, **1958.** 2 figs., 3 tables, 14 refs., 11 eqs. **DWB, DLC**—The distribution of continents and oceans largely determines the inertia of the Earth's crust. The axis about which the moment of inertia is a maximum pierces the surface 400 miles southwest of Hawaii. This is the position the north pole would eventually occupy provided (1) the equatorial bulge is not "frozen" but will adopt (in a time of order τ) the shape appropriate to diurnal rotation, (2) oceans and continents are isostatically balanced, (3) the distribution of ocean and continents remains fixed relative to one another, and (4) no other comparative asymmetries in the distribution of matter exist. The rate of polar migration depends on τ. Bondi and Gold have interpreted the damping of the 14-month wobble in terms of plastic flow in the Earth's mantle, and obtain $\tau = 10$ years. If this value were applicable, then under the foregoing assumptions the travel time of the pole to Hawaii is 100,000 yrs, a rate of travel 1000 times the upper limits given by astronomical measurements during the last sixty years and by paleomagnetic evidence over the last 10 million yrs. For earlier times the paleomagnetic evidence indicates a direction opposite to that derived here. This leaves some questions to be answered. *Subject Headings:* **1. Polar migrations.**—*Author's abstract.*

12.9–149 526.17:525.14

Bomford, G., **The figure of the earth: its departure from an exact spheroid.** *Geophysical Journal*, London, 3(1):83–95, March **1960.** 3 figs., 21 refs. **DWB, DLC**—It has long been known that the figure of the Earth, defined as that of the Geoid or sea-level equipotential surface, is not exactly an oblate spheroid, and it is recognized that the aim of the geodesist is not only to determine the dimensions of a "best-fitting" spheroid, but to map the true form of the geoid by contoured charts showing its departure from some defined spheroidal datum surface. A. H. Cook (1959) describes recent progress in the determination of the low-degree harmonic constants in the Earth's gravitational field, and thence in the deduction of the dimensions of the best-fitting spheroid. The present paper described recent progress in the measurement of the irregular departures of the geoid from any spheroid, with special reference to their direct measurement by the method of geoidal or "astro-geodetic" section. *Subject Headings:* **1. Earth's figure 2. Geoidal measurements.**—*Author's abstract.*

D2. GEOTHERMY

12.9–150 525.213 551.511.1:551.521.1:551.525.4

†MacDonald, Gordon J. F. (*Inst. of Geophysics, Univ. Calif.*), **Calculations on the thermal history of the earth.** *Journal of Geophysical Research*, Wash., D. C., 64(11): 1967–2000, Nov. 1959. 13 figs., 26 tables, 84 refs., 30 eqs. **DLC**—The possible thermal history of a spherically symmetric earth is studied by comparing numerical calculations of the development of temperature within a number of model earths with observations on the present thermal state of the earth. The pertinent observations are the following: 1) The average surface heat flow is 1 ergs/cm² sec. 2) The mantle of the earth is solid. 3) The electrical conductivity increases rapidly in the outer few hundred kilometers of the earth. It is shown that models which incorporate a wide range of initial conditions and distributions of radioactivity reproduce in a qualitative fashion the electrical conductivity of the earth. Models which have a radioactive content equal to an earth composed of chondritic meteorites reproduce the present surface heat flow to within a factor of 2. This is a consequence of the near coincidence of the present rate of heat production in a chondritic earth and the heat flux of the actual earth. The variability in heat flow among models is due to varying contributions of 'initial heat,' higher rate of radioactive heat production in the past, and the depth of burial of heat sources. The solid nature of the mantle provides a further qualitative restraint on possible earth models. However, a lack of experimental data on melting relations at high pressures precludes detailed conclusions. The general features of temperature-depth curves are similar for many models in which energy is transmitted by radiation as well as by ordinary lattice conduction. The gradient of temperature is high near the surface but decreases within the earth as the effective conductivity increases with increasing temperature. The melting temperature is most closely approached or exceeded in the outer few hundred kilometers of the earth. The variation of surface heat flow with time is examined. It is shown that the surface heat flow is constant in time for a wide range of models, provided that heat is transmitted solely by radiation and conduction. *Subject Headings:* **1. Thermal history of earth.**—*Author's abstract.*

12.9–151 551.23:683.97:621.311

Benseman, R. F. (*Dept. Scientific, Indust. Res., Lower Hutt, New Zealand*), **Estimating the total heat output of natural thermal regions.** *Journal of Geophysical Research*, Wash., D. C., 64(8):1057–1062, Aug. 1959. 2 figs., 3 tables, 6 refs. **DLC**—The natural flow of heat from a thermal region is a first indication of the amount of steam that might be continually drawn from bores to generate electric power. Methods are described for assessing the natural heat flow by such agencies as steaming ground, geysers, springs, fumaroles, and the underground seepage of hot water to nearby streams or lakes. *Subject Headings:* **1. Natural thermal regions** **2. Heat flow in thermal regions.**—*Author's abstract.*

12.9–152 551.233

Nekhoroshev, A. S., **K voprosu o teorii deĭstviia geĭzerov.** [Theory of geyser activity.] *Akademiia Nauk SSSR, Doklady*, 127(5):1096–1098, 1959. 10 refs., 1 eq. **DWB, DLC**—After discussing various theories, explaining the action and origin of geysers, the author presents a mathematical physical analysis of the thermodynamic processes in geyser formation and formulates the sufficient and necessary conditions for the origin of a geyser regime. The necessary conditions are those facilitating the boiling of superheated water in the channel of a cold even if this water does not reach the surface before the beginning of eruption. Under natural conditions geysers differ from constantly boiling sources in that in the former boiling begins within the column of water in the channel, while in the latter, boiling occurs at the point where it arrives at the surface. The necessary conditions are those in which, from a given instant after the start of eruption, the boiling in the entire column of fluid in the channel is replaced by surface boiling of the water arriving and by the production of steam, the liquid forming after cooling should remain in the channel. The conditions for continuous geyser activity are outlined. *Subject Heading:* **1. Geyser activity.**—*I.L.D.*

D3. VOLCANOLOGY

See also: **Survey of Nyiragongo Volcano** (Bonnet), **12.9–196.**

12.9–153 551.21

Chaigneau, Marcel; Fabre, René and Tazieff, Haroun, **Sur l'extraction et l'analyse des gaz occlus dans la lave du volcan Nyiragongo.** [The extraction and analysis of the gases occluded in the lava of the Nyiragongo volcano.] *Annales de Géophysique*, Paris, 16(4): 561–564, Oct./Dec. **1960.** fig., 2 tables, 10 refs. **DLC**—Study of the nature of occluded gases based on surface samples taken by the mission of the Centre de Volcanologie de Belgique at the Nyiragongo volcano in August 1959. In the first section, the authors state the method of extraction and of analysis of anhydrous gases; in the second they deal with the dosage of water contained in the lava. From the analyses of the extracted gases it may be implied that the lava impounds a large amount of carbon dioxide and carbon monoxide, and also hydrogen and nitrogen, but that the sulphur dioxide is completely released as it reaches the surface of the lake. The anhydrous gases represent about 31.2% of the whole of the release. *Subject Headings:* **1. Volcanology 2. Volcanic gas analyses 3. Nyiragonga Volcano, Belgion Congo.**—*A. V.*

12.9–154 551.21:536.242:535.33

Delsemme, A. H., **Spectroscopie de flammes volcaniques.** [Spectroscopy of volcanic flames.] *Académie Royale des Sciences d'Outre-Mer, Brussels, Bulletin des Séances*, N. S., 6(3):507–519, **1960.** 2 figs., 3 tables, 11 refs. **DLC**—During the geophysical expedition at the Nyiragongo volcano (Belgian Congo) in Aug.–Sept. 1959, the author recorded the spectrum of a volcanic flame. The spectra were made in the visible and ultra-violet by means of a spectrograph with lens and quartz prisms. This recording is compared with that obtained by J. VERHOOGEN during the Nyamuragira eruption in 1938–1940. The presence of *Na* and *K* is observed in both cases. All the bands from 6000 to 4000 Å have been identified. A double line results from sodium, another double line from potassium and the 25 remaining molecular bands result exclusively from the diatomic molecule *CuCl*. A continuum observed between 6600 and 5600 Å might be easily explained either by the molecular association NO+O, or by the presence of *CaO* in the flame or by both processes simultaneously. The author refutes the interpretation of J. VERHOOGEN concerning the existence of the first positive system of nitrogen, hypothesis which had been suggested to explain certain fuzzy bands. This point is important for all the visible emissions are provoked by excitation potentials equal or inferior to 3 *eV* which correspond to the flame temperature and it is no more necessary to call on hidden or badly defined sources to justify the large activation energies (nearly 10 *eV*) required for the appearance of the first positive system of nitrogen. Excitation energies should exclusively be of thermal origin. *Subject Headings:* **1. Volcanic eruptions 2. Volcanic flame spectrum 3. Nyiragongo Volcano, Belgian Congo.**—*A. V.*

12.9–155 551.213.1(477.9)

Lebedinskiĭ, V. I. and Shalimov, A. I., **Verkhnetriasovyĭ vylkanizm v Krymu.** [Upper Triassic volcanism in the Crimea.] *Akademiia Nauk SSSR, Doklady*, 132(2):425–427, **1960.** 11 refs. **DWB, DLC**—Magmatic formations of the Crimean Mountains and other geological characteristics, described in given references (1–11), are briefly reviewed. Recent geological studies disclose some new characteristics, which lead to corrections in the concepts of lower age boundary of the volcanic activities in the Crimean Mountains. Detailed geological survey of the Salgin-Almir region conducted in 1955–57, indicates two phases of the magmatic activities at upper Triassic time: intrusive and extrusive. Other characteristics, found in the vicinity of village Petropavloka are described in detail for each of three stratigraphic sections of the geologic formations: Taurian series, volcanogenetic complex and Eski-Orda series. A brief account of the mineralogical elements and the evidences of various fauna is also given. *Subject Headings:* **1. Volcanism 2. Triassic volcanism 3. Crimean ASSR:**—*N.P.S.*

12.9–156 551.21:550.342(675)

Shimozuru, D., **Etude séismologique du volcan Nyiragongo.** [Seismological study of the Nyiragongo volcano.] *Académie Royale des Sciences d'Outre-Mer, Brussels, Bulletin des Séances*, N.S., 6(3):464–482, **1960.** 16 figs., 4 photos. **DLC**—This is an analysis of damping

volcanic microseisms, their amplitude, period and relationship with volcanic activity. It is based on observations made from Aug. 5 to Sept. 6, 1959 at the time of the geophysical exploration of the Nyiragongo Volcano (Kivu) elaborated by the Centre National de Volcanologie and by the Institut pour la Recherche Scientifique en Afrique Centrale. It gives a description of the seismographs used and peculiarities of their location. The analysis of the microseisms has shown that the period of vibration of volcanic microseisms depends very little on the source, on their generating mechanisms and is very little influenced by the paths followed by the waves. It seems that the predominating period of volcanic microseisms radiating from their source has close connections with the magma's nature; viscosity and chemical composition. The average amplitudes of volcanic microseisms in the inner and outer parts of the crater oscillate between 0.2 and 6.5 microns. As regards the damping of volcanic microseisms, the attenuation coefficient is ranging about 0.3×10^{-5}/cm for long period waves and 0.5×10^{-5}/cm for short period waves. Some consideration is given to the source of volcanic microseisms and earthquakes of volcanic origin. *Subject Headings:* **1. Volcanic microseisms 2. Volcanic microseisms amplitude 3. Geophysical expedition 4. Nyiragongo volcano, Kivu-Belgian Congo 5. National Center of Volcanology 6. Institute for Scientific Research in Central Africa.**—*A.V.*

12.9–157 551.21(491.1)

Thorarinsson, Sigurdur (*Museum of Natural History, Reykjavik/Island*), **Die Vulkane Islands.** [Volcanoes of Iceland.] *Naturwissenschaftliche Rundschau*, Stuttgart, 13(3):81–87, March **1960.** 14 figs., table.—The volcanic activity in Iceland is demonstrated by statistical data on the number of volcanoes, the extent of lava fields and the number of craters. With the application of so-called tephrachronological investigations, i.e. including various kinds of eruption matter under the collective terminus of tephra, a classification of the volcanoes is presented. The various types of volcanoes based on this classification are described and analyzed. The illustrations, mostly photographs of typical volcanoes, show also the area of fast active volcanoes, the different types by table and profile. The isopachyte map of the tephra layer of the Öreafajökull eruption of 1362, a schematic diagram of a typical eruption, cycle of Hekla, and the origin of pseudo-crater-groups based on a hypothesis are treated in the text. *Subject Headings:* **1. Volcanoes 2. Tephra deposits 3. Iceland.**—*O.T.*

12.9–158 551.541:551.596:551.2

Yasui, Y. and Ijichi, K., **A study on the propagating velocity of air vibration wave caused by the eruption of Volcano Sakurajima.** *Journal of Meteorological Research, Tokyo*, 11(12): 1010–1017, Dec. **1959.** fig., 5 tables, 7 refs. In Japanese. **DWB**—This article deals with the characteristics of Volcano Sakurajima, located in Kagoshima; 1000 m above sea level, diameter 500 m, etc., from March 1956 to June 1957, using the seismograph of propagating velocity of air vibration at 1/3 km/sec. A table shows the result of comparison in terms of intensity of seism, scale of smoke, estimation of sound speed, and time of air vibration in Sakurajima and the vicinity of Shiroyama. The kinds of air vibration wave, sound speed and time of air vibration by each seismic intensity and maximum width of air vibration intensity are discussed. *Subject Headings:* **1. Volcanic eruption measurements 2. Sakurajima Volcano, Kagoshima, Japan.**—*K.C.*

D4. GEOCHEMISTRY

See also: **Age of Earth** (Hurley), 12.9–17.

12.8–159 550.42

†*Shaw, Denis M., **The geochemistry of gallium, indium, thallium: a review.** *Physics and Chemistry of the Earth*, Vol. 2, N. Y. Pergamon Press, **1957.** p. 164–211. 3 figs., 17 tables. **DWB** (551 P578), **DLC** (QC501.P53)—The history, chemistry and cosmic abundance of the elements gallium, indium, and thallium are discussed and the geochemistry of each reviewed. These elements were all discovered and studied spectroscopically. Distribution of each in meteorites and igneous rocks (basic granitic minerals, metamorphic rocks, sulphides), crustal abundance, etc. are given in extensive tables. Cosmic abundance seems to be greater than crustal abundance for gallium, but content of indium and thallium in meteorites is not too well

known. An excellent bibliography is appended. *Subject Headings:* **1. Geochemistry of rare earths 2. Gallium, indium, and thallium in earth's crust.**—*M.R.*

12.9–160 550.462

Schmalz, Robert F. (*Dept. of Geology, Harvard*), **A note on the system Fe_2O_3-H_2O.** *Journal of Geophysical Research*, Wash., D. C., 64(5):575–579, May **1959.** 4 figs., table, 4 refs., 5 eqs. **DLC**—Hydrothermal investigation of a portion of the system Fe_2O_3-H_2O has served to locate approximately the hematite-goethite phase boundary. Calculations derived from the experimental data provide the following estimates of the thermodynamic properties of goethite at 25°C: $\Delta H_f = -132$ Kcal/mol; $S° = +18.1$ cal/mol-degree; $\Delta S_f = -51.0$ cal/mol-degree; $\Delta G_f = -117$ Kcal/mol. Goethite is shown to be the stable ferric oxide phase under sub-aerial weathering conditions where relative humidity exceeds 60%. Goethite is also shown to be stable in all normal marine environments, though hematite may become stable in contact with saline liquors of an evaporite basin. *Subject Headings:* **1. Hematite-goethite phase boundary 2. Goethite.**—*Author's abstract.*

12.9–161 550.462:551.464

Ronov, A. B., (*Inst. Chemistry Moscow*), **On the post-Proterozoic evolution of the composition of the atmosphere and hydrosphere.** *International Oceanographic Congress*, 1*st*, *N. Y.*, 1959, *Preprints of abstracts of papers.* Issued Wash., D. C., AAAS, **1959.** p. 73–76. In English and Russian. **DWB** (551.46082.161pr)—Measurements of the volumes of volcanic and carbonate rocks of all series of the Devonian, Carboniferous, Permian and Triassic systems on the present continents have been made and the results of the study of the chemical composition of the sedimentary rocks (26,000 specimens) on the Russian platform representing the whole section from the upper Proterozoic to the Quaternary have been examined. For comparison published analyses of North American rocks of the same age were used. These data indicate that the equilibrium system between the atmosphere and the ocean in the past provided a mechanism for the removal and fixation of carbon dioxide rising up from deep within the earth. A decrease of carbon dioxide in the system between atmosphere and the ocean also took place. *Subject Headings:* **1. Atmospheric composition 2. Hydrospheric composition 3. Sea water composition 4. CO_2 cycles.**—*I.S.*

D5. SEISMOLOGY

12.9–162 550.34

Marchal, Anatole F., **La terre tremble : pourquoi?** [The earth shakes : why?] *Industrie*, Brussels, 14(7):477–489, July **1960.** fig., photos.—Brief historical account of the important seisms which caused great devastations and statement of the fundamental seismological notions. The author gives the international intensity scale which permits to rate a seism at a given point between the twelve degrees of this scale. The notions on focus, epicenter, aftershock, seisms at sea, tide-races and seismic waves are shortly laid out. The last part of the paper deals with the seisms which have occurred in Belgium. The most important was recorded on June 11, 1938. It affected a macroseismic area of 120.000 sq km comprising 14 centers with an intensity degree corresponding to VII. The author shows that the solution of the problem of seisms and consequently their forecast is not yet within the range of modern sciences. *Subject Headings:* **1. Seismology 2. International seismic intensity scale 3. Seismic damages.**—*A.V.*

12.9–163 550.340.19:621.398

Newstead, Gordon and Watt, P. A. (*both, Univ. Tasmania*), **A telemetered seismic net in Tasmania.** *Nature*, London, 186(4726):704–705, May 28, **1960.** fig., 3 refs. **DWB**—The purpose of this note is to describe new ideas which have arisen from contact between seismology and electronics. The developments have followed two lines. First the application of electronic amplifiers and the principles of feedback servomechanisms to the design and construction of seismographs. Second has been the consideration of problems in observational seismology from the point of view of information theory as the problem of extracting a message from a noisy background. We are working on an arrangement using magnetic recording on tape with electronic reduction of the information. Eventually, it will be possible to produce tapes

which can be fed into digital computers for processing in various ways. *Subject Heading:* **Seismic measurement techniques.**—*E.Z.S.*

12.9–164 550.340.19(57)

Novye seĭsmicheskie stantsii v Sibiri i na Dal'nem Vostoke. [New seismic stations in Siberia and in the Far East.] *Priroda*, Moscow, No. 8:112, Aug. **1959. DLC**—In connection with the organization of the new Siberian Branch of the USSR Academy of Sciences the range of seismic studies in Siberia will be greatly increased and a series of seismic stations of the general and regional types will be built in 1959 and 1960 in the Altai-Tuva, Baikal, Iakut and the Far Eastern regions. It was proposed also to organize during 1961–1965 new seismic stations equipped with the most modern instruments at Abakan, Narym, Noril'sk, Chita, Blagoveshchensk, Komsomol'sk-on the Amur, on Chukotski Peninsula and in other points. *Subject Headings:* **1. Seismic stations 2. Siberia.**—*A.M.P.*

12.9–165 550.340.19(52)

Tokyo. Univ., Earthquake Research Institute, **Earthquake Research Institute, University of Tokyo, 1960.** Tokyo, Japan, Kokusai Bunken Insatusha, **1960.** 138 p. 144 figs., 6 tables, 12 eqs.—An extensively illustrated publication containing information about the University of Tokyo Earthquake Research Institute. The Institute was established on 13 Nov. 1925. First, a brief historical sketch is given, and then the organization and administration of the Institute is described. The major part of this bulletin outlines the research in the Institute. These consist of studies in theoretical seismology, statistical study on earthquakes, seismological observations, study on microseism, explosion seismology, studies of the earth's crust and its deformation, volcanology, geothermy and geomagnetism, gravity, oceanography and engineering seismology. *Subject Headings:* **1. Earthquake research 2. University of Tokyo, Earthquake Research Institute.**—*I.S.*

12.9–166 550.340.6(99) 550.342(99)

Sytinskiĭ, A. D., **Seĭsmicheskie nabliudeniia v Mirnom.** [Seismic observations in Mirny.] *Sovetskaia Antarkticheskaia Ekspeditsiia*, 1955–, [*Materialy*], Vol. 2, issued in Leningrad, **1959.** p. 153–156. 3 figs. **DWB** (M82/99 K81pe)—Selection of the location of the seismic station in Mirny is discussed with regard to the elemination of the interferences from various machines, such as electric station, radio stations, airdromes, running tractors and trucks. The photo copy of the seismogram with records of microseisms during winter-spring season is given for illustration of intensive interference preventing the observation of traces of earthquakes. The character of the microseisms varied with seasons. During winter-spring season microseisms mostly have a period of 1–10 sec; during summer-autumn they have a period of 2–5 sec. The amplitudes increase near outer edge of ice. From June 1956 to Feb. 1957, 196 earthquakes were registered. The coordinates of the epicenters of 38 earthquakes were determined on a map (fig. 3). Most earthquakes were located south and southeast of Australia. This indicates the existence of a volcanic belt from Australia to the Antarctic. This belt seems to connect another belt from the Indian Ocean to the Pacific in the region south from Makkuori Island. A more detailed study of observed data will give additional information on the earthquakes and seismicity of little known southern regions and also may connect the microseisms with the meteorological phenomena. *Subject Headings:* **1. Seismic investigations 2. Earthquake belts 3. Microseismic interference.**—*N.P.S.*

12.9–167 550.341.2:662.2

O'Brien, P. N. S. (*British Petroleum Co. Ltd.*), **Seismic energy from explosions.** *Geophysical Journal*, London, 3(1):29–44, March **1960.** 3 figs., 9 tables, 18 refs., eq. **DWB, DLC**—For underwater explosions, it is shown that the amplitude of the first arrival of the ground wave should be proportional to $W^{\frac{1}{3}}$, where W is the charge weight. Also that its frequency content should be independent of W. Of the total chemical energy of the explosive it is estimated that about 3% is available in the frequency range 0–100 c/s. For underground explosions it is postulated that the radiated pressure pulse begins to obey infinitesimal strain theory once its impulse per unit area has decreased below a limiting value. This value is constant for a given rock type. From this it follows that the seismic amplitude should usually

be directly proportional to W. But for high frequencies or very large charges it should become proportional to $W^{\frac{1}{3}}$. These predictions are compared with observational data, both original and those previously published. They agree well for underground explosions. For underwater explosions the data are themselves inconsistent and more are needed. *Subject Headings:* **1. Underwater explosions 2. Underground explosions.**—*Author's abstract.*

12.9–168 550.340.8:550.342

Bernard, P., **Un séismographe étalon pour l'étude des microséismes.** [A standard seismograph for the study of microseisms.] *Annales de Géophysique*, Paris, 16(3):419–421, July/Sept. **1960.** 4 figs., 6 refs. **DLC**—Description of the principal elements and the functioning principle of a short-period seismograph with equilibrium position and proper oscillation period, both varying very little with temperature changes. This seismograph constitutes a standard instrument with accurately known amplification curve, the scale of which can vary according to the microseismic agitation amplitude, practically according to the season, so as to make the best possible use of the recordings without having to modify any adjustment of the seismograph. *Subject Headings:* **1. Seismographs 2. Microseism recorders.**—*A. V.*

12.9–169 550.341

Byerly, Perry, (*Univ. Calif.*), **Earthquake mechanisms.** *Science*, Wash., D. C., 131(3412): 1493–1496, May 20, **1960.** 4 figs., 17 refs. **DLC**—A brief review of the fundamentals of seismology including the work from OMORI to SCHEIDEGGER and HODGSON. Theory going back to STOKES and LOVE indicates that a sudden force applied to a part of an infinite homogeneous elastic medium sends out waves of longitudinal and transverse types. The directional character of at least the beginning of these waves is preserved at a distance. This character depends on the nature of the force system applied at the source. It is widely agreed that the energy released as seismic waves was gradually stored as potential energy of strain before the shock. The moot question is just how this strain energy is transformed into the kinetic energy of wave motion. *Subject Heading:* **1. Earthquake mechanisms.**—*E.Z.S.*

12.9–170 551.24:550.341

Karmaleeva, R. M., **Popytka prognoza blizkikh zemletriasenii vo vremeni.** [An attempt to forecast the time of near earthquakes.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizich.*, No. 3:467–474, March **1960.** 8 figs., 4 tables, 7 refs. Transl. into English in the corresponding number of its *Bulletin of the Academy of Sciences, USSR, Geophysics Series.* **DLC**—During the summer of 1958, the author investigated the gradual movements of the earth's crust preceding earthquakes by analyzing observations of the slope of the earth's surface obtained at Stalinabad seismic station, since anomalies in the direction of variations of slopes were found to precede earthquakes. On days without earthquake recordings vector diagrams constructed from mean 24 hr data of variation of slope showed smooth curves with two turning points at 8 and 12 hrs local time produced by the daily temperature variation. Average data eliminate the temperature effect so that on quite days γ = the angle of turning of the vector is equal to zero. On days with recordings of earthquakes the "normal" variation of slope changes both with near and distant earthquakes of sufficient force. Disturbances in the daily variation of slopes, especially the appearance of S = turns 2–3 hrs before either manifest or latent earthquakes were observed for (1) $\Delta \leqslant 800$ km with earthquake intensity $M \geqslant 4$; (2) $800 \leqslant \Delta < 4000$ km with earthquake intensity $M \geqslant 5$ and (3) $\Delta \geqslant 4000$ km with intensity $M \geqslant 5\frac{1}{2}$. The calculations of the angle of the turning point is demonstrated and the relevant equations and results of calculations are presented. Examples of specific earthquakes and calculations of slopes of the earth's surface preceding them are presented. *Subject Headings:* **1. Earthquake forecasts 2. Stalinabad, U.S.S.R.**—*I.L.D.*

12.9–171 550.341.6:662.2:539.1

†Griggs, D. T. (*Univ. Calif.*) and Press, Frank (*Calif. Inst. of Tech., Calif.*), **Probing the earth with nuclear explosions.** *Journal of Geophysical Research*, Wash., D. C., 66(1):237–258, Jan. **1961.** 4 figs., 2 tables, 22 refs. **DLC**—Progress in seismology is reviewed with emphasis on the usefulness of past nuclear weapon tests in determining the internal structure of the earth. Shot times and locations are tabulated for 169 U. S. atomic explosions, with seismic data from

sadena. The advantages of using large chemical explosions and future nuclear explosions tonated under the Plow-share program as controlled energy sources for carefully instrumented smological experiments are discussed. Finally, an international program of explosions for smological research is proposed, and specific suggestions are made for attacking several tstanding problems in seismology by means of chemical and clean nuclear explosions and e instrumentation network proposed at Geneva for nuclear test detection. Deep oceanic ismometer lines are proposed as a means for making important improvements in seismic nowledge of the world and possible improvements in the detection of atomic explosions. *ubject Headings:* **1. Seismology research programs 2. Nuclear test detection by seismological terpretations.**—*Author's abstract.*

12.9–172 550.341.6:551.14

Nishimura, Eiichi; Kamitsuki, Akira and Kishimoto, Yoshimichi (*all, Kyoto Univ., yoto*), **Some problems on Poisson's ratio in the earth's crust.** *Tellus*, Stockholm, 12(2):236–41, May 1960. 8 figs., 6 refs., eqs. **DWB, DLC**—Instead of the time-distance graphs, the P-S diagram is effectively employed to estimate the value of Poisson's ratio in the earth's crust. his diagram is advantageous, especially to detect its local anomaly or distribution. The btained results are as follows: 1) Applying this method to 18 earthquakes occurring in south-estern Japan, the domain with anomalously large Poisson's ratio was found in the Kyushu istrict. This hits to the possibility of an existence of a local magmatic reservoir. 2) The zimuthal distribution of the crustal Poisson's ratio in case of earthquake occurrence was vestigated and it was found to be considerably different in the push- and pull-zone of initial eismic motion. This may be related to the state of stress accumulation causing the earthquake ccurrence. *Subject Headings:* **1. Poisson's ratio in the earth's crust 2. P-S diagrams.**—*uthor's abstract.*

12.9–173 550.342:551.515.1/2

Tabulevich, V. N., **O nekotorykh sluchaiakh vozbuzhdeniia mikroseĭsm v Atlanticheskom Tikhom okeanakh.** [Some cases of microseismic excitation in the Atlantic and Pacific ceans.] *Akademiia Nauk SSSR, Doklady*, 132(4):814–817, **1960.** 4 figs., 6 refs. **DWB, LC**—The study of microseisms and their correlation with the meteorological conditions are sed for indication of cyclonic and storm processes. The work of other investigators, listed in iven references, are reviewed with a view to theoretical and practical consideration on the rigin of microseisms by the stationary sea waves and convergence of wind, and waves eflected from the precipitous (steep) rocky coast. Determination of coordinates of the enter of the excitation of the microseisms and their trajectory lead to location of cyclonic egion, which is important for hydrometeorological forecasting and marine transportation. n ref. (5) the author describes the method for location of microseismic center in the Caspian ea. Complicated meteorological conditions above the ocean often originates many excita-ions of the microseisms. Synchronous variation of the microseism frequency at different eismic stations, can reproduce the same combination of signals. Therefore, many coastal nd continental stations can be grouped with the signals of the same periods, corresponding to he same source of the excitation of microseisms. Practical application of this method for many stations in the Atlantic basin during the period Jan. 16–19, 1958, is described with charts, aps, and evaluation of the results. *Subject Headings:* **1. Microseismic studies 2. Meteoro-gical conditions causing microseisms.**—*N.P.S.*

E. ASTRONOMY AND ASTROPHYSICS

See: **Universe at large** (Bondi), 12.9–9.

E1. SUN

See also: **Sun-Troposphere Conf.-Leningrad, 1960** (Kolobkov), 12.9–52.

12.9–174 551.590.21:523.164.32

Simon, Paul, **Application des observations radioélectriques solaires à l'étude des relations olaires-terrestres.** [Application of radioelectric solar observations to the study of solar-

terrestrial relations.] *International Council of Scientific Union, Brussels, Ninth Report of the Commission for the Study of Solar and Terrestrial Relationships.* Pub. Paris, **1957.** p. 69–74. 3 figs., 19 refs. **DWB**—Radioelectric solar observations have been made for about ten years. A brief explanation of methods and wavelengths used in the global observations of the sun is given. For 1947–51, one hundred and sixty five *R* spots and 212 *Q* spots have been identified. The passage to the central meridian of active regions is discussed. A resume is given of chromospheric observations. Two figures show the distribution of sunspots as correlated with geomagnetic activity. *Subject Headings:* **1. Solar-terrestrial relationships 2. Solar observations.**—*E.Z.S.*

12.9–175 523.746:551.513.1

Spitsyna, N. L., **Ob odnom konkretnom primere vozdeĭstviia rekurentnykh solnechnykh piaten na atmosfernuiu tsirkuliatsiiu.** [A specific example of the effect of sunspot cycles upon the atmospheric circulation.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy,* No. 87:46–55, **1959.** 10 figs., 4 refs. **DWB**—There is some basis to suppose that effects of solar activity may be determined when studying strong sunspot activity. Therefore, the author analyzed the effects of sunspot cycles using specific cases. Some materials of this study have already been published. The present article seeks to describe the results in greater detail. 1951 was chosen, a year of not great solar activity. This was done so that the effects of activity, when it did occur, could be measured against the normal. An analysis of all cases of solar activity during the year followed. Several isoline charts are used to illustrate the discussion. The development of synoptical processes and the intra-atmospheric factors determine the heterogeneity of reaction of the atmosphere to fluctuations of solar activity, but in the North Atlantic area, the cyclonic regimen, apparently reacts fairly positively to any intensification of solar activity. *Subject Headings:* **1. Sunspot cycle effects on atmospheric circulation 2. Atmospheric circulation-sunspot relationships 3. North Atlantic area.**—*N.G.*

12.9–176 523.746:551.513.1:551.524.32

Vitel's, L. A., **Solnechnaia aktivnost', preobrazovaniia form atmosfernoĭ tsirkuliatsii i vnutrimesiachnye kolebaniia temperatury.** [Solar activity, changes in the form of atmospheric circulation and temperature fluctuations within a month.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy,* No. 87:56–65, **1959.** 7 figs., 5 refs. **DLC**—The basis for this article was the previously established fact of the existence on the sun of the so-called active latitudes. Groups of sun spots may remain active for a period of months. This should be reflected on the earth, all things being equal, in one form or another. The active latitudes of the sun, being long range, quasi-permanent areas of increased solar activity, create conditions for homogeneous processes in the earth's atmosphere on certain days of the 27-day solar calendar. A full analogy of phenomena in each 27 day cycle is not necessary. Mean daily temperatures of 10 stations of European USSR were used as initial date. More detailed data from Moscow and Leningrad were utilized. On the basis of the discussion, the conclusion was made that the characteristics of large scale atmospheric circulation experience fluctuations tied to certain dates of the solar calendar, i.e., to certain active latitudes of the sun. These fluctuations also result in the fluctuation of temperatures at certain points of European USSR. *Subject Headings:* **1. Atmospheric circulation—sunspot relationships 2. Sunspot effects on temperature 3. U.S.S.R.**—*N.G.* Ⓢ

12.9–177 523.74:551.510.535:551.594.5:550.385

†Mariani, F. and Molina, F., **Perturbazioni geomagnetiche, aurorali, ionosferiche e dei raggi cosmici: interdipendenze e relazioni con l'attivita solare.** [Geomagnetic, auroral, ionospheric, and cosmic ray disturbances: interdependence and relation with solar activity] *Annali di Geofisica,* Rome, 13(1):85–128, Jan./March **1960.** figs., tables, 57 refs. Italian and English summaries p. 126–127. **DLC**—Following the study of magnetic storms and associated phenomena, ionospheric perturbations are analyzed. Recent results on the distribution of time variations of foF2 and h'F2 are described. A short account is given of what is known about the behavior of F1 and E layers during perturbation. Recent statistical results on the geographic and time distribution of Es and black-outs are described, as well as their association with the various forms of geomagnetic and auroral activity. Black-out phenomena considered

some detail. *Subject Headings:* **1. Ionospheric perturbations 2. Solar activity-auroral relationships 3. Geomagnetic perturbations 4. Black-out phenomena.**—*E.Z.S.* Ⓢ

12.9–178 551.590.21:551.513.1

Rakipova, L. R., **O vozdeĭstvii solnechnoĭ aktivnosti na obshchuiu tsirkuliatsiiu atmosfery.** [Effect of solar activity upon the general circulation of the atmosphere.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 87:40–45, **1959.** table, 11 refs. **DLC**—Any change in the cyclonic activity must substantially reflect upon the intensity of the general circulation, especially upon the middle latitude air exchange. Macroturbulence is a considerably dynamic factor in the formation of general circulation. A discussion of the mechanics of interaction between the various layers of the atmosphere follows. A general conclusion, to the effect that increased solar activity results in greater cyclonic activity, is reached. As a consequence, there is a change in the type of circulation in the middle latitudes. The increase in the baric gradients between cyclones and anticyclones obtained theoretically in this article, provide a physical basis for many results of statistical studies of the effect of solar activity upon the general atmospheric circulation. *Subject Heading:* **1. Solar effects on atmospheric circulation.**—*N.G.* Ⓢ

12.9–179 551.521.64:523.75

†Sakurai, Kunitomo (*Geophys. Inst. Kyoto Univ.*), **Propagation of low energy cosmic ray particles associated with solar flares.** *Journal of Geomagnetism and Geoelectricity*, Kyoto, 11(4):152–164, **1960.** 7 figs., 3 tables, 34 refs. **DWB**—It has been observed that the low energy cosmic rays are produced associated with solar flares and propagate into interplanetary space. In this paper, we examined the features of the propagation mechanism of these cosmic rays, taking into account the results deduced from the theory of geomagnetic effect on these low energy cosmic rays. In consequence, we can conclude that the features of their incidence to the earth must have the impact zone effects, G.M.T. effects, and seasonal variations. Then, we examined the relations between these low energy cosmic ray events and solar and terrestrial phenomena in view of the observed data and made clear that both flares and type IV outbursts taking place on western side of the sun seem to correlate these cosmic ray events much better. Taking into account those results we tried to explain reasonably the propagation mechanism of these low energy cosmic rays into interplanetary space and in addition to estimate the properties of magnetic clouds in that space. *Subject Headings:* **1. Solar flares 2. Low energy cosmic ray particles 3. Cosmic ray propagation 4. Magnetic clouds in space.**—*Author's abstract.* Ⓢ

E2. ECLIPSES

See also: **Geodetic coordinated from eclipse obs.** (Dambara), 12.9–147; **Eclipse effect on F layer** (Setty), 12.9–216.

12.9–180 523.78 535.242

de Jager, C.; van der Meulen, J. C.; Mak, A. et al., **Eclips-Expeditie naar Fuerteventura mislukt.** [The Eclipse Expedition to Fuerteventura falls through.] *De Meteoor*, Utrecht, 15(5/6):51–62, Nov. **1959.** 6 figs.—An introduction is given by Hemert Tot Dingshof; the eclipse expedition is described by C. de Jager and the time service in the eclipse camp by J. C. Van Der Meulen. Four photoelectric photometers were built to measure the brightness of a part of the solar crescent some ten seconds around 2nd and 3rd contacts. The photometers were constructed on two guiding telescopes. B. J. Vastenholt gives a description of the electric equipment for the photoelectric photometers which should determine the brightness of a part of the extreme solar crescent during the eclipse. With a multiplier the brightness of a part of the crescent should be measured between the two contacts. After two years of preparations the purpose has not been attained. *Subject Headings:* **1. Eclipse expeditions 2. Photoelectric photometers equipment. I. Vastenholt, B. J. II. Heynekamp, Chr.**—*A.V.* Ⓢ

12.9–181 551.506:551.590.24(431)

Bramicki, O., **Der Verlauf einzelner meteorologischer Elemente in Potsdam während der Sonnenfinsternis (Zeitangaben in MOZ).** [The variations of individual meteorological

variables during the solar eclipse, with time given in Central European Time.] *Germany. Deutscher Demokratische Republik. Meteorologischer und Hydrologischer Dienst, Veröffentlichungen*, No. 16:30–32, **1955.** 2 figs. **DWB, DLC**—Data for wind, cloudiness, sunshine, temperature and humidity are given. The effect of eclipse is rather small. *Subject Headings:* **1. Eclipse effects 2. Potsdam, Germany.**—*A.A.*

12.9–182 523.78:525.48

Georgetown Univ. Wash., D. C., College Observatory, **USAF-Georgetown solar eclipse project,** Contract AF 19(604)-880, Final Report June 1953 to Jan. 1957. Issued Jan. **1958.** 16 p. tables. **DWB**—A method of measuring long arcs on the earth's surface by means of observations of solar eclipses is discussed. Two expeditions in which this method was employed are described in detail as to sites, equipment, organization and data recorded. The method of analysis of the observational data is also included. This covers the following points: a) Exploration of Data, b) Development of Theory, c) Correction of Constants, d) Improvement of Methods, e) Reduction of Photographic data. *Subject Headings:* **1. Geodetics 2. Earth's surface measurements during solar eclipses.**—*Author's abstract.*

12.9–183 523.78 551.590.24

Low, Robert J. (*High Altitude Obs.*), **Observing plans for October's eclipse.** *Sky and Telescope*, N. Y., 17(8/9), June/July, **1958.** Abstracted from reprint of 8 p. photos.—The plans to observe the eclipse of the sun Oct. 12, 1958, near the time of maximum solar activity are described, and compared with the previous experience of Feb. 25, 1952. The five American expeditions have selected the Danger Islands, an atoll group at 10°55′S, 165°50′ W for observations where U.S.S. Thomaston, a floating drydock will steam back and forth in the ocean two or three miles from the atoll. Naval Research Laboratory were to launch six rockets carrying instruments to observe the sun's Lyman-alpha radiation and X-rays. If the sun were to exhibit a single highly disturbed region, they would fire one rocket just before the moon covered up the active region of the sun, and the second one just afterward to get information about the disturbed area itself. The National Bureau of Standards was to supplement and check the rocket measurements by its radio experiment. It was to measure changes in the ionization density of the earth's ionosphere at different heights. Optical observations concern the solar corona and rapid-sequence photography of the flash spectrum. J. E. Marsh and D. H. Liebenberg of the University of Wisconsin are developing instruments for measuring the profiles and absolute intensities of the green coronal light. The Wisconsin team undertook to map the corona appearing in the yellow and green emissions. The group of the California Academy of Sciences and of the U. S. Naval Radiological Defense Laboratory wanted to measure the intensity of the white-light corona at large distances from the sun's surface. Using the experiences of the 1952 flash-spectrum observations, a triple spectrograph was provided to get detailed information on how the properties of the chromosphere change with height. The equipment of this triple-spectrograph and its operation are described. Another program of the California Academy-Radiological Laboratory Group is the study of eclipse shadow bands. *Subject Headings:* **1. Solar eclipse Oct. 12, 1958 2. Eclipse observation expeditions.**—*O.T.*

E3. PLANETS

12.9–184 523.4:778.3:522.2:551.507.321

de Vaucouleurs, Gérard, **High-resolution planetary photography with a balloon-borne telescope.** Harvard Univ. College Obs., Contract AF 19(604)-3074, Scientific Report No. 1, April 1, **1959.** Consists of 2 reprints. His: **Requirements of high-resolution photography of the planets.** (In: Institute of the Aeronautical Sciences, **Applications of manned stratospheric laboratories. 1959.** p. 7–29. 9 figs., table, 6 refs., eqs.) **DWB** (M(051) V847ap). (Abstracted separately.) Also his: **Notes on the optical design of a balloon-borne telescope for high-resolution photography of the planets.** (Unidentified reprint, probably *IAS Report*, 1959.) 25 p. 9 figs., 11 refs.—This paper discusses the resolution limit in planetary photography from the point of view of the platform stabilization and guidance requirements, assuming optimum performance of the optical system. 1) The elementary geometric approach involves the conventional Rayleigh tolerance and corresponding Dawes "resolution limit" for a given

perture, the magnification of the system matching the conventional resolution of the photographic plate. For a 24-inch telescope this treatment suggests that a stabilization to a few tenths of a second of arc for periods of a few seconds of time may be sufficient. 2) The actual physical problem involves photometric considerations such as the intensity modulation of the diffraction pattern of a real target of arbitrary size, shape and contrast including the effect of light diffracted at large distances in an extended source such as a planetary disk. 3) The reproduction of the physical diffraction image by the photographic plate is discussed next in terms of effective resolution (i.e. the signal/noise ratio) as a function of size, shape and contrast of the optical image and of the "speed of resolution" as a function of emulsion sensitivity and contrast factor. The limitation of exposure time by the planet's rotation is evaluated. The maximum tolerable amplitude of the uncorrected pendular oscillation of the balloon-gondola system is determined. Table I gives a summary of the relevant data for all planets and some satellites. *Subject Headings:* **1. Planetary photography 2. Balloon-borne telescopes.**—*Author's abstract.* Ⓢ

12.9–185 551.507.362:523.3/4

Gold, T. (*Harvard College Observatory*), **Space research in relation to the moon and the nearer planets.** *Royal Society of London, Proceedings, Ser. A*, 253(1275):487–491, Dec. 29, 1959. **DWB, DLC**—A brief discussion referring to the experiments that are in a planning stage or which are within the range of present techniques for the investigation of the moon, Mars, Venus and the sun with space vehicles. The experiments would include: to take and radio back pictures; to make measurements of the magnetic fields, gas flow and of the high speed particle fluxes. *Subject Headings:* **1. Space exploration 2. Moon 3. Planetary research.**—*E.K.* Ⓢ

12.9–186 551.507.362:521.312:523.43

Dugan, James F., Jr. (*Lewis Research Ctr., Cleveland, Ohio*), **Analysis of trajectory parameters for probe and round-trip missions to mars.** *U. S. National Aeronautics and Space Administration, Technical Note* D-281, June 1960. 68 p. 20 figs., 7 refs., eqs. **DWB, DLC**—For one-way transfers between Earth and Mars, charts are obtained that show velocity, time, and angle parameters as functions of the eccentricity and semilatus rectum of the Sun-focused vehicle conic. From these curves are obtained others useful in planning one-way and round-trip missions to Mars. The analysis is characterized by circular coplanar planetary orbits, successive two-body approximations, impulsive velocity changes, and circular parking orbits at 1.1 planet radii. For round trips, the mission time considered ranges from 130 to 1000 days, while wait time spent in the parking orbit around Mars ranges from 0 to 454 days. Departure dates, one-way travel times, and individual velocity increments are presented for round trips requiring minimum total velocity increments. A set of 22 working charts for Earth-Mars trajectories is made available. *Subject Headings:* **1. Mars probe trajectories 2. Earth-Mars trajectories 3. Round-trip to Mars.**—*NASA.* Ⓢ

12.9–187 523.4:523.164.32

Franklin, K. L., **An account of the discovery of Jupiter as a radio source.** *Astronomical Journal*, New Haven, Conn., 64(2):37–39, March 1959. **DLC**—The author describes his discovery of Jupiter as a radio source. The discovery was made on Mills Cross, world's largest radio telescope in association with Bernard Burke the operator of the telescope. A feature characteristic of interference eventually led to the actual discovery that the source of this "interference" was no other than Jupiter itself. *Subject Headings:* **1. Radio sources 2. Jupiter radio interference.**—*I.S.* Ⓢ

E4. MOON

See also: **Meteorites, Moon, etc.** (Marchal), **12.9–192.**

12.9–188 523.3

Ring, J. (*Department of Physics, University of Manchester*), **The Moon.** *Times Science Review*, London, No. 39:3–4, Spring 1961. 5 figs. **DLC**—This paper is a review of present lunar research. The first topographical maps of the moon were made from visual observations.

Recently great strides have been made in the development of electronically controlled cameras and long-focus telescopes allowing much more accurate and detailed maps to be drawn. By observing the lengths of shadows on the lunar surfaces, it has been found that lunar slopes are rarely inclined more than a few degrees. The blurring effect of the earth's atmosphere and the inaccuracy of the lunar coordinate system have been the main stumbling blocks of the visual methods of measurement. Observations of the scattering of sunlight by the moon's surface shows a roughness on the scale of a few inches. Reflection of radar waves indicate smoothness on a scale of a few meters. Observations of the luminescence of certain portions of the moon's surface suggest the presence locally of mineral deposits. Observations of the infra-red radiation spectrum enable deductions to be made about the heat conductivity of the surface. Observations of temperature changes show that parts of the surface are exposed rocks, others are covered by a layer of dust. Various theories of the origin and mode of settling of this dust are outlined. The major controversial point however is concerned with the origin of the moon's crater's which are thought to be caused either by volcanic activity or meteoric impact. The main contributions of satellite observation are the pictures of the far side of the moon. The possibilities of future research are noted. *Subject Heading:* **1. Lunar research.**—*R.B.* Ⓢ

12.9–189 551.507.362.1:523.3

Blagonravov, A. A. (*Acad. Sciences, Moscow*), **Description of the first space station photographing the Moon.** *International Space Science Symposium, Nice, Jan.* 1960, *Space Research: proceedings of the First Symposium.* Pub. **1960.** p. 1109–1113. 3 figs. Russian summary p. 1109. **DWB** (523.1 I61sp)—A description is given of the interplanetary automatic station of the Soviet Union, which for the first time, photographed the reverse side of the moon and made other scientific observations. The cosmic rocket was launched on Oct. 4, 1959. The program, which coordinates the orbital position of the vehicle at any time, with the telemetering system and with the photographic equipment, is discussed. The position of the camera, while photographing the reverse side of the moon, is shown. *Subject Headings:* **1. Moon photography 2. Interplanetary automatic station 3. Cosmic rockets.**—*Author's abstract.* Ⓢ

12.9–190 523.34

Kopal, Zdenek (*Dept. Astronomy, U. Manchester, England*), **Some current problems of lunar topography.** *International Space Science Symposium, Nice, Jan.* 1960, *Space Research: proceedings of the First Symposium.* Pub. **1960.** p. 1123–1131. 5 figs., 8 refs. Russian summary p. 1123. **DWB** (523.1 I61sp)—Account is given of a collaborative programme of work in lunar topography, now in progress between the University of Manchester and the Observatoire du Pic-du-Midi, under the auspices of the U. S. Air Force. Attention is drawn to the necessity of obtaining a set of accurate selenographic co-ordinates for a sufficiently large number of control points over the visible lunar hemisphere. The data presently available are not only too few, but refer mostly to points whose locations are too ambiguous to be identifiable with the requisite precision. *Subject Headings:* **1. Selenographic coordinates 2. Moon's topography.**—*Author's abstract.* Ⓢ

12.9–191 523.36

Urey, H. C. (*Univ. Calif., La Jolla, Calif.*), **Lines of evidence in regard to the composition of the Moon.** *International Space Science Symposium, Nice, Jan.* 1960, *Space Research: proceedings of the First Symposium.* Pub. **1960.** p. 1114–1122. 2 tables, 10 refs. Russian summary p. 1114. **DWB** (523.1 I61sp)—There are two principal lines of evidence with regard to the composition of the moon. The first rests upon the problem of the density of the moon which is low, compared with the terrestrial planets. Making reasonable assumptions one finds that the density at ordinary pressures and temperatures may be somewhere in the neighborhood of 3.4. This is distinctly lower than that of the chondritic meteorites which have been fairly well investigated. Calculation shows that the probable abundance of total iron in the moon lies somewhere in the neighborhood of 10 or 11% as compared with 22 and 28% for two groups of chondrites. This indicates that the moon has more nearly the solar composition as indicated by recent astronomical studies, and also that the composition agrees better with current

eories for nucleogenesis than does the composition of the meteorites. *Subject Headings:* **Moon's composition 2. Nucleogenesis theory.**—*Author's abstract.* Ⓢ

E5. METEORITES

12.9–192 523.346:523.51

Marchal, Anatole F., **Les météorites, la lune et quelques autres choses.** [Meteorites, oon and some other things.] *Industrie*, Brussels, 14(2):120–125, Feb. **1960.** fig., 4 photos. This article starts with a short historical survey of the renowned fire-balls observed during 014 through 1955, with a description of their main physical characteristics. General con-derations are expressed about a fire-ball's orbit and the relationships between meteorites and nar cirques. After having reviewed the various hypotheses and theories on lunar relief, the thor concludes that the causes of this relief seem to be internal and not external. The lunar lief presents a well marked volcanic character: seas, craters and cirques result from internal uptive forces whose activity decreased progressively in the course of time. The end of the ticle concerns the origine of life on earth. The author briefly reviews the results obtained by IPMANN who analyzed a thick meteorite which struck California, and in the center of which found living microbes astonishingly similar to a terrestrial microbe, the *Spirillum vibrum.* *ubject Headings:* **1. Meteorites 2. Meteorites-lunar craters relationships 3. Meteorite nalysis 4. Origin of life.**—*A.V.* Ⓢ

12.9–193 551.506.22:551.507.362.2:523.51.

Dubin, Maurice (*Air Force Cambridge Res. Center*), **IGY micrometeorite measurements.** *nternational Space Science Symposium, Nice, Jan.* 1960, *Space Research: proceedings of the irst Symposium.* Pub. **1960.** p. 1042–1058. 7 figs., 2 tables, 13 refs. Russian summary . 1042. **DWB** (523.1 I61sp)—Direct measurements of micrometeorites were obtained during he IGY by monitoring the impacts of cosmic dust on satellites and deep space probes. The rgest data sample resulted from an experiment using crystal transducers to detect impacts pon the exposed sensitive area. The impact rate on Alpha 1958 was 8.0×10^{-3} meters^{-2} sec^{-1} or cosmic particles of mass greater than 8×10^{-10} g based upon the calibration and an impact elocity of 30 km/sec. The density of cosmic material in space at one astronomical unit is $\times10^{-22}$ g cm^{-3} for this component of cosmic dust, or approximately 10^{-20} g cm^{-3} based upon mass distribution assumption. The density of cosmic material measured from Pioneer I is ss by more than an order of magnitude than that measured on Alpha 1958; the impact rate as 4.0×10^{-3} meters^{-2} sec^{-1} for particles of mass greater than 10^{-10} grams for similar impact onditions. These measurements are compared in relation to daily and diurnal variations. *ubject Headings:* **1. IGY micrometeorite measurements 2. Micrometeorite impact measure-ents 3. Cosmic dust measurements 4. Satellite micrometeorite measurement 5. Deep pace probes.**—*Author's abstract.* Ⓢ

12.9–194 551.521.64:523.51

Geiss, Johannes and Oeschger, Hans (*both, Dept. Physics, U. Berne, Switzerland*), **The mpact of cosmic radiation in meteorites.** *International Space Science Symposium, Nice, Jan.* 0960, *Space Research: proceedings of the First Symposium.* Pub. **1960.** p. 1071–1079. 5 ables, 28 refs., 5 eqs. Russian summary p. 1071. **DWB** (523.1 I61sp)—From tritium ontents in small stony meteorites a primary cosmic ray flux of 0.6–0.8 particles/cm^2 sec sr ith $E_{kin}\geq300$ MeV is calculated. Intensity variations of the cosmic radiation with time an be detected by comparison of cosmic ray produced radioisotopes in meteorites. Radiation ges (exposure ages) of meteorites from He^3/tritium contents and from other isotopes are iscussed. The oldest observed radiation ages lead to an upper limit of 2×10^{-7} g/cm^2 year or the space erosion rate of iron meteorites. From this figure an upper limit of 3×10^{-22} g/cm^3 or the dust density along the path of the iron meteorites in space may be evaluated. It is hown that radiation ages of the order of 10^7 years or younger are not affected appreciably y space erosion, but rather give the time of the creation of the meteorite by a break-up rocess from a larger object. *Subject Headings:* **1. Meteorite age 2. Radio isotopes in me-eorites.**—*Author's abstract.* Ⓢ

12.9–195 551.510.53:551.510.42:523.51

†Mirtov, B. A., **Meteornaia materiia i nekotorye voprosy geofiziki vysokikh sloev atmosfery.** [Meteoric matter and some problems in the geophysics of upper atmospheric layers.] *Iskusstvennye Sputniki Zemli*, Moscow, No. 4:118–134, **1960.** 5 figs., 4 tables, 34 refs., 9 eqs. **DLC**—On the basis of photographic, radar and satellite data available in the literature, the author attempts to relate the phenomena of light scattering in the upper atmosphere and the glow of the night sky to meteoric matter. The discussion includes the following: dust of terrestrial origin and its distribution in the upper atmosphere, meteoric particles above 80–90 km, specific content of dust in the upper layers of the atmosphere, scattering of light on particles of cosmic dust and the characteristics of the glow of the night sky and its possible micrometeoric origin. *Subject Headings:* **1. Night sky glow from meteoric dust 2. Light scattering 3. Meteoric matter in upper atmosphere 4. Terrestrial dust in upper atmosphere.**—*I.L.D.*

E6. GEOMAGNETISM

See also: **Auroral cosmic rays and solar activity** (Mariani, Molina), 12.9–177; **Current-system of geomag. variations** (Fukushima, Maeda), 12.9–210.

12.9–196 550.384.6:551.21(675)

Bonnet, G., **Levé magnétique du volcan Nyiragongo (23 août–13 septembre 1959)** [Magnetic survey of the Nyiragongo Volcano (August 23–September 13, 1959).] *Académie Royale des Sciences d'Outre-Mer, Brussels, Bulletin des Séances, N.S.*, 6(3):489–504, **1960.** 7 figs., 3 tables. **DLC**—During the geophysical expedition at the Nyiragongo volcano during Aug.–Sept. 1959, detailed magnetic surveys have been made in the inner and outer parts of the volcano along a 45 km way forming a circle tangential to the volcano. These observations have permitted to put into evidence the anomalies of the vertical component of the earth's magnetic field so as to draw provisional conclusions on the internal constitution of the volcano. The author reports on the equipment used, the location of the stations and describes the measurement reduction. Schematic charts reproduce the approximate values of the declination (D), of the horizontal component (H), of the inclination (I) and of the vertical component (Z). The isanomalous lines of Z in thousands of γ are also reproduced on a schematic chart showing their regularity and their strong horizontal gradient. The analysis of the isanomalous curves must lead to conclusions as to the internal structure of the volcano. *Subject Headings:* **1. Geophysical expeditions 2. Nyiragongo volcano, Kivu-Belgian Congo 3. Geomagnetic field measurements 4. Geomagnetic field anomalies 5. Geomagnetic field intensity gradient**—*A.V.*

12.9–197 550.382.8:551.521.64

Heirtzler, J. R. and Hirshman, J. (*both, Columbia Univ.*), **Measurements of the geomagnetic field near Capetown.** *Journal of Geophysical Research*, Wash., D. C., 65(9):3016–3018, Sept. **1960.** 3 figs., 4 refs. **DLC**—Measurements off the southwest coast of Africa acquired on the cruises of the R. V. VEMA during 1957 and 1958 are reported in connection with the anomalously weak geomagnetic field near Capetown suggested by DESSLER and KARPLUS in 1959 and 1960 as responsible for an observed particle flux gap in the electron belt of the Van Allen radiation zones which may allow neutron-decay electrons to be supplied to the outer zone. The tracks of the cruises and the total field as a function of distance along each leg of the tracks are illustrated. It does not seem that any of the fluctuations exceeding 150 g are due to short time variations of the field. It does not seem justified to draw 1000-γ contours from the limited data. The obtained values are more in accord with the U.S.S.R. isomagnetic maps for 1955 than with the U. S. maps although extensive information from the Soviet Union was not available. *Subject Headings:* **1. Geomagnetic fields 2. Van Allen radiation belts 3. Capetown, Union of South Africa.**—*O.T.* Ⓢ

12.9–198 523.74:550.385.4

Pohrte, T.; Warwick, C. and Macdonald, N., **A search for geomagnetic singular days.** *Journal of Geophysical Research*, Wash., D. C., 65(9):3013–3015, Sept. **1960.** table, 3 refs.

LC—The results of research on a possible difference between years of high solar activity and ears of lower activity are presented. The description of indices shows that the dates of large viations do not correspond from one study to another. The descriptions include studies of l years combined; those of recurrent storms, and years with lower solar activity; and studies nonrecurrent storms and years of high solar activity. The Table on selection of days of rge deviation shows that there are no singular days for geomagnetic disturbance. *Subject eadings:* **1. Geomagnetic singular days 2. Geomagnetism and solar activity relationships.** *-O.T.* Ⓢ

12.9–199 551.506.22:550.386(71)

Whitham, K.; Loomer, E. I. and Niblett, E. R. (*all, Dominion Obs., Ottawa, Canada*), **he latitudinal distribution of magnetic activity in Canada.** *Journal of Geophysical Research*, ash., D. C., 65(12):3961–3974, Dec. **1960.** 11 figs., table, 31 refs. **DLC**—Hourly ranges in ie principal horizontal field component have been measured for sixteen Canadian IGY agnetic observatories and variation stations. The latitudinal variation of disturbance easured by this index has been determined seasonally and as a function of disturbance. One ation, Alert, at the northern end of Ellesmere Island, confirms the existence in these longitudes f an apparently narrow zone or area of enhanced magnetic activity, as defined by this measure f disturbance. Semipersistent structure is also apparent in the principal auroral zone in the eridian sections of magnetic activity. Diurnal occurrence patterns, amplitude-frequency lots, the diurnal variation of the mean disturbance field, and the physical significance of this nge index have been investigated in an attempt to explain this apparent inner maximum of agnetic activity. More homogeneous very high latitude data are required to determine the orphology of the anomalous region found. *Subject Headings:* **1. Magnetic activity distribu- on 2. Auroral zones 3. Ellesmere Island, Canada.**—*Author's abstract.* Ⓢ

12.9–200 551.521.67:550.385

Zhigulev, V. N. and Romishevskiĭ, E. A., **O vzaimodeistvii potokov provodiashcheĭ sredy magnitnym polem Zemli.** [Interaction between conducting medium fluxes and the magnetic eld of the Earth.] *Akademiia Nauk SSSR, Doklady*, 127(5):1001–1004, **1959.** 2 figs., table, refs. **DWB, DLC**—The movement of the earth through interplanetary ionized gas and the nteraction of corpuscular streams of the sun with the earth's magnetic field are investigated nd the possible simultaneous interaction of particles and the simultaneous influence on ionized as current with the magnetic field of the earth are considered. An approximation of magnetic ydromechanics is used and the medium is regarded as an ideal continuum. The interaction f the ionized gas current with the earth's magnetic field is reduced to the phenomenon of "magnetic twisting" consisting of the fact that the current of ionized gas during its motion nvelops a certain cavity comprising the earth's magnetic field; outside of the cavity is the agnetic field, on the boundary of the cavity the magnetic pressure balances the gas dynamic ressure; the normal component of the magnetic field at the boundary equals zero. The athematical equations describing the interactions and the analysis of an actual example are resented. *Subject Headings:* **1. Magnetic twisting 2. Earth's magnetic field 3. Solar orpuscular streams—geomagnetism relationships.**—*I.L.D.* Ⓢ

E7. WHISTLERS

12.9–201 551.594.6

Crombie, D. D., **Measurement of the arrival angle of "whistlers."** *Journal of Geo- hysical Research*, Wash., D. C., 60(3):364–365, Sept. **1955.** table. **DLC**—In response to STOREY's suggestion (1953) that atmospheric noises ("whistlers") are due to signals from electrical disturbances in the atmosphere which have traveled along lines of the Earth's mag- netic field from one hemisphere to the other, the author suggests that this idea can be verified by determining the direction of arrival of the whistlers. (If direction is same as geomagnetic field at measuring site, Storey's theory gains considerable support.) Pertinent equations for such measurement are discussed. Characteristics of the electronic equipment and orientation of aerials are discussed. *Subject Heading:* **1. Whistler propagation.**—*A.J.M.*

12.9–202 551.508.86:551.594.6 538.69:532.59

Delloue, Jean, **La détermination de la direction d'arrivée et de la polarisation des atmosphériques siffleurs, Pt. 1, Les dispositifs expérimentaux.** [The determination of the direction of arrival and of the polarization of whistlers, Pt. 1, Experimental devices.] *Journal de Physique et le Radium*, Paris, 21(6):514–526, June **1960.** 12 figs. French and English summaries p. 514–515. **DLC**—This article starts with a brief and very clear account of the characteristic features of the various electromagnetic perturbations of natural origin, and more particularly of those affecting the very low frequencies band. The author specifies the present state of knowledge on whistlers; he lays out the Storey-Eckersley theory which is based on the magneto-ionic theory to account for whistling atmospherics and suggests a peculiar mode of propagation of very low frequency electromagnetic waves along the lines of force of the earth's magnetic field through the feebly ionized regions of the outer atmosphere. As a check to the foregoing theory, he tries to determine the directions of arrival of whistlers which should make a rather small angle with the direction of the magnetic field, and their polarization which is related through a magneto-ionic formula to that angle. The article then goes on by giving an account of the measurement techniques and of some aspects of the problem and their influence on the apparatus design. It also describes the various parts of the equipment and the successive modifications to the whole of measurements as required in the course of the experiences. Difficult interpretation of diagrams observed on measuring oscillographs, both for the determination of the directions of arrival and for the polarization is then discussed. A simple method of representing the characteristics of a whistler is proposed. *Subject Headings:* **1. Whistler analysis 2. Whistler measurement techniques 3. Whistler recorders 4. Storey-Eckersley theory 5. Magneto-hydrodynamic theory.**—*A. V.* Ⓢ

12.9–203 551.594.6:551.508.86

Delloue, Jean, **La détermination de la direction d'arrivée et de la polarisation des atmosphériques siffleurs, Pt. 2.** [The determination of direction arrival and polarization of whistlers, Pt. 2.] *Journal de Physique et le Radium*, Paris, 21(7):587–599, July **1960.** 13 figs. 1 table, 9 refs. French and English summaries p. 587. **DLC**—In a previous article (*see* 12.9–202) equipment for the determination of the direction of arrival and of the polarization of whistling atmospherics was described. The rather difficult interpretation of the patterns recorded is now discussed. A simple way of representing the directions of arrival is proposed and the rules are to be observed to obtain usable phase patterns are explained. A study of the polarization of whistlers shows that provided a few simplifying assumptions are made, the average conditions along the trajectory of a whistler can be represented by a simple parameter τ which along with the angle between the direction of arrival and the magnetic field determine the polarization ellipse in the wave front. The polarization observed depends then on the direction of arrival and can be deduced from the previous one by a cylindrical projection. Polarization diagrams are the only convenient way of solving the inverse problem and to determine the parameter τ. Experimentation on the field requires a considerable amount of effort and the percentage of success is low. It has been nevertheless possible to show that the direction of arrival rotates around the magnetic field and makes a rather small angle, between 5 and 25°, with that direction. No angle smaller than 5° was observed. The projected polarization depends on the direction of arrival as well as on the conditions encountered along the propagation path. Our results are consistent with the directions of arrival observed, and lead to electronic densities smaller than those quoted by STOREY. The approximation used by Storey to deduce the properties of whistlers from Booker's quasi-longitudinal theory appears not to be sufficient. A more complete calculation might account for the absence of direction of propagation in the vicinity of the magnetic field. The occurrence of sequences of several strong whistlers with the same polarization and phase characteristics within the same sequence could be explained in terms of the sudden appearance in the outer atmosphere of ionized centres with the short life time of about a few minutes. *Subject Headings:* **1. Whistler polarization 2. Whistler measurement techniques 3. Whistler recorders 4. Whistling sferics.**—*Author's abstract.* Ⓢ

12.9–204 551.594.6:551.510.53:551.594.13

†Ondoh, Tadanori (*Kyoto Univ.*) and Hashizume, Syoichiro (*Nat'l Defense Agency, Tokyo*) **Effect of proton gyration in the outer atmosphere represented on the dispersion curve of**

istler. *Journal of Geomagnetism and Geoelectricity*, Kyoto, 12(1):32–37, 1960. 2 figs., ble, 12 refs., eq. **DWB**—A short whistler was observed at Kyoto (geomagnetic latitude 7°N) during 1958 and was defined to frequencies below 1KC/S. In this paper the whistler, portedly the purest of all the ones observed at Kyoto, is analyzed in order to detect the effect proton gyration on the whistler dispersion. The method adopted to detect the effect of oton gyration in the outer atmosphere is the complete dispersion law given by STOREY (1956). he calculated results and the observed values of the complete dispersion are graphically presented. *Subject Headings:* **1. Whistlers 2. Proton gyration effects 3. Whistler dispersion.**—*I.S.* Ⓢ

12.9–205 551.510.535:551.510.62:551.594.6

Rybner, Jorgen and Ungstrup, Eigil, **Research on relationships between natural atmospheric radio phenomena and geomagnetic field.** [Denmark. Science Foundation], Contract 61(514)-1309, Technical Final Report, July 1, 1959. 11 p. 3 figs., 3 tables. **DWB** M(051)1613te)—The investigation consists in recording audio-frequency radio-wave phenomena at Godhavn, Greenland, in cooperation with the U. S. National Committee of U.R.S.I. the request of the American Committee which has erected a chain of stations along the East oast of America. The work is being sponsored by the European Office of the U. S. Air Research and Development Command, and by the Danish Science Foundation and the Danish esearch Foundation for Technical Sciences. The work consists in recording for two minutes very hour the electromagnetic atmospherics of audio-frequencies by means of a special equipent consisting of an aerial, an amplifier, and a specially built tape recorder. The equipment as been built and designed at the laboratories of the Royal Technical University of Denmark. he equipment was set up at Godhavn in the period from June 3, 1957, and regular service as begun July 19, 1957, at 0000 GMT. Measurements are carried out at 35–37 minutes ast every whole hour. The present report covers the observations until the end of July, 1958. he phenomena investigated fall in three groups: whistlers, chorous and hiss, and earth urrents. *Whistlers* are sounds formed by dispersion of lightening cracks during the passage the electromagnetic wave energy through the ionosphere and the outer space from the point origin to the magnetically conjugated point of the earth. Whistlers are expected to occur ery seldom at such high magnetic latitudes but have been observed on a considerable number days, and their frequency spectrum varies in a peculiar manner which seems to indicate an onormal type of propagation. These results are discussed in Technical Note No. 2. *Chorus nd hiss* are types of sound frequently observed. A detailed account of the distribution over he day and year is given in this report together with a discussion of the long- and short-period orrelation with other ionospheric phenomena. *Earth-currents* have been recorded during a w months, and an account of the observations and their correlation with the magnetic activity given in Technical Note No. 1. *Subject Headings:* **1. Atmospheric radio phenomena Whistlers 3. Chorus and hiss 4. Earth currents.**—*Author's abstract.* Ⓢ

12.9–206 551.501.8:551.510.535·551.594.6

Singleton, D. G. (*Physics Department, University of Queensland, Brisbane*), **Spread-F and e latitude variation of occurrence of whistlers.** *Nature*, London, 189(4760):215–216 an. 21, 1961. fig., 5 refs. **DWB**—A diagramatic representation is given of how the range, values of the ionization enhancement factor for spread *F* varies with geomagnetic latitude. he results would seem to indicate that the explanation of the latitude variation of whistler ctivity based on propagation within field aligned ducts is consistent with ideas at present eing used to interpret the frequency-spreading component of spread-F. *Subject Headings:* **Whistlers 2. Spread-F.**—*R.B.* Ⓢ

12.9–207 551.594.13:551.501.83:621.396.8

Schmelovsky, K. H., **The electron density distribution derived from whistler data and araday-fading observations.** *Journal of Atmospheric and Terrestrial Physics*, N. Y., 19(1):68–1, Sept. 1960. 2 figs., 4 refs., 4 eqs. **DLC**—During 1958/59, 500 records of mean electron ensity distribution up to 1200 km height were computed through Faraday-fading process. he electron densities for greater heights can be better determined by whistler measurements ecause the outer part of the propagation path plays a predominant part in dispersion process.

The author combines these two methods. *Subject Headings:* **1. Whistler data 2. Faraday fading observations 3. Electron density distribution.**—*A.H.K.* Ⓢ

F. OUTER ATMOSPHERE

F1. IONOSPHERE

See also: **Symposium on ionized gases in magn. fields** (Japan Science Council, Ion. Res. Comm.), 12.9–2; **Natural atmos. radio phenomena-geomag. field relationships** (Rybner, Ungstrup), 12.9–205; **Ionosphere echo polarization** (Carlson), 12.9–266.

12.9–208 551.510.535:551.510.6

Bates, Howard F. (*Univ. Alaska*), **Direct HF backscatter from the F region.** *Journa of Geophysical Research*, Wash., D. C., 65(7):1993–2002, July **1960.** 7 figs., 14 refs. **DLC**— Using the records of the oblique-incidence, sweep-frequency (1–25 Mc/s) scatter sounde located at College, Alaska, we show that a commonly observed winter daytime echo is direc scatter from a patch of field-aligned *F* region irregularities. The range of this particula echo is constant with frequency out to its junction with the least-time-path echo. Becaus it is not enhanced by any type of focusing mechanism, we term it a strong-scatter echo. A series of records for Dec. 16, 1958, is shown and discussed in detail. The behavior of th strong-scatter *F* region echo and another *F* region direct-scatter echo during the transitiona periods of sunrise and sunset indicates that the field-aligned irregularities are distribute randomly over wide areas at night but that during the day they exist only in relatively smal patches. From this we infer that the sun has a smoothing effect on the ionosphere. *Subjec Headings:* **1. F layer scattering 2. Sweep frequency measurement 3. Ionospheric echoes** —*Author's abstract.* Ⓢ

12.9–209 551.507.362.2:551.510.535:551.594.1

Garriott, Owen K. (*Radio Prop. Lab. Stanford Univ.*), **Ionospheric electron content an distribution determined from satellite observations.** *International Space Science Symposium Nice, Jan.* 1960, *Space Research: proceedings of the First Symposium.* Pub. **1960.** p. 371–38 10 figs., 10 refs., 13 eqs. French and Russian summaries p. 371. **DWB** (523.1 I61sp)— Observations of the polarization rotation of the signals from 1958 δ_2 (Sputnik III) have provide values of the integrated electron density up to the satellite height. In the eight month perio analyzed, the high passages have yielded measurements of the total ionospheric electron conten and its diurnal variation. As the height of the low passages increased from less than 300 k to over 900 km at the observing latitude, an estimate of the "average" electron density profil has been obtained. This profile shows a reduction in electron density to 50% of the maximu values at a level of 135 km above the height of maximum density and a concentration equa to 20% of the maximum at a level of 450 km above the height of the maximum density. Sever distortions of the quiet day profile are implied by measurements of the total electron conten on days of high magnetic activity. *Subject Headings:* **1. Ionosphere electron content 2. Sat ellite measurements in ionosphere 3. Satellite density measurements.**—*Author's abstract.*

12.9–210 551.510.535:550.38

Fukushima, Naoishi and Maeda, Rikio, (*both, Geophysical Institute, Tokyo Univ.*), **Three dimensional consideration for current-system of geomagnetic variations, Pt. 1, Current flo for polar elementary storm within a spherical conducting shell, Pt. 2.** *Japan. Science Council Ionosphere Research Committee, Report of Ionosphere and Space Research in Japan*, 13(4):267 272, **1959.** 2 figs., 8 refs., 10 eqs. **DWB, DLC**—The magnetic field produced by three dimensional electric current flow in the ionosphere is studied in the case of a polar elementar storm. By means of a very simple assumption of constant and isotropic electrical conductivit throughout the ionosphere of finite thickness, the toroidal and poloidal magnetic fields withi the conducting region are compared with each other. So far as such a simple model for th ionosphere is acceptable, the present interpretation for the results of experimental measuremen of the earth's magnetic field in the upper atmosphere by rocket sounding is correct, because th

hange with height of the toroidal magnetic field appearing only in the ionosphere as well as the oloidal magnetic field contributes to the steep change of magnetic field accompanying the enetration of the electric current sheet. *Subject Headings:* **1. Ionospheric models 2. Electric urrents in ionosphere 3. Magnetic field variations.** —*Author's abstract.* Ⓢ

12.9–211 551.510.535:551.594.12

Krasovskiĭ, V. I. (*Acad. Sciences, Moscow, USSR*), **Corpuscular heating of the outer mosphere.** *International Space Science Symposium, Nice, Jan.* 1960, *Space Research: roceedings of the First Symposium.* Pub. 1960. p. 90–94. 2 figs., 11 refs. Russian summary p. 90. **DWB** (523.1 161sp)—Special instruments carried in the third Sputnik measured owerful fluxes of electrons of about 10 keV at heights up to 1900 km. The energy of the ectrons exceeded 100 erg cm^{-2} sec^{-1} at that altitude. The energy of electron fluxes, able to each the F-layer of the ionosphere, has been estimated to reach values of about 1 erg cm^{-2} ec^{-1}. It is indicated that the heat flux brought by these electrons, can well account for the ncrease of temperature with height and latitude. *Subject Headings:* **1. Electron flux energy easurements 2. F-layer 3. Ionospheric temperature measurements.**—*Author's abstract.* Ⓢ

12.9–212 551.510.535:551.594.12

Lepechinsky, D. and Taieb, C. (*both, Ionosphere Group CNET, Bagneux, France*), **Sur la étermination des hauteurs réelles de l'ionisation dans les hautes latitudes.** [Determination f true height of ionization in the high latitudes.] *Journal of Atmospheric and Terrestrial hysics*, London, 18(2/3):152–159, June 1960. 4 figs., table, 5 refs., 13 eqs. English summary p. 152. **DLC**—The *z*-trace which often appears on ionograms of high latitude stations is sually much better defined than the *o*-trace, the latter being rather diffuse. True height eterminations including the earth's magnetic field now in use being all based on the *o*-trace, he writers propose a new matrix method similar to that of Dr. K. G. Budden but applicable o the *z*-trace. The appropriate matrix has been calculated (for $f_h = 1.8$ Mc/s) for frequencies p to 6 Mc/s and the results of a profile determination is presented involving both "*o*" and -matrix methods for a typical Terre Adélie ionogram. *Subject Headings:* **1. Ionization gradients in ionosphere 2. Ionospheric height determination.**—*Authors' abstract.* Ⓢ

12.9–213 523.746:551.510.535:551.594.13

†Lyon, A. J.; Skinner, N. J. (*both, Univ. College, Ibadan, Nigeria*) and Wright, R. W. H. (*Univ. College of Ghana*), **The belt of equatorial spread-F.** *Journal of Atmospheric and Terrestrial Physics*, London, 19(3/4):145–159, Dec. 1960. 7 figs., 21 refs. **DWB**—The morphology of the belt of equatorial spread-F at sunspot maximum is investigated using IGY data, for magnetically quiet and magnetically disturbed conditions respectively. The belt is found o extend from about 30°S to 30°N in magnetic latitude and to have a region of very high ncidence, exceeding 90% for the early part of the night, about 20° wide in latitude and centered n the dip equator. In Africa and India there is little seasonal variation in quiet-day incidence, ut a marked seasonal variation occurs in the American zone where there is a pronounced minimum in local winter. Throughout the whole belt from 30°S to 30°N there is a strong nverse correlation between spread-F incidence and magnetic activity. Moreover the post-unset rise of the base of the layer, which usually precedes the onset of spread-F shows a marked positive correlation with spread-F incidence within the belt. No existing theory seems adequate to account for all of these facts but it seems likely that hydromagnetic disturbances are involved. *Subject Headings:* **1. Spread-F variations 2. Hydromagnetic disturbances 3. Africa 4. India.**—*Authors' abstract.* Ⓢ

12.9–214 551.557:551.510.535:550.386.6

Mitra, S. N.; Vij, K. K. and Dasgupta, P. (*all, Res. Dept., "All India Radio," New Delhi*), **Horizontal drift in the ionosphere over Delhi.** *Journal of Atmospheric and Terrestrial Physics*, London, 19(3/4):172–183, Dec. 1960. 19 figs., 4 refs. **DWB**—Some results obtained at Delhi on the measurement of ionospheric drift by spaced receiver technique are described. Most probable velocities of reflections from the F- and E-layers for different seasons are indicated by histograms. The diurnal variations of the magnitude and direction of the drift velocity have been plotted graphically. Harmonic analyses of the east-west and north-south

components of the drift velocity have been worked out. No predominant periodicity in any of the components was observed. It is interesting to note that the most probable direction of the drift velocity is towards the south, and the northward component is almost completely inhibited. During magnetic storms, however, the northward component increases and its variation appears to be well correlated with the variation of the "K" index. *Subject Headings:* **1. Ionospheric drift measurements 2. Magnetic storm influences 3. K index variations.**—*Authors' abstract.* Ⓢ

12.9–215 551.507.362.2:551.510.535:551.594.12

Klinker, L.; Schmelovsky, K. H. and Knuth, R., **Jahreszeitliche Variationen der mittleren Elektronen Konzentration zwischen 400 und 1200 km Höhe.** [Seasonal variations of electron concentration between 400 and 1200 Km.] *Die Naturwissenschaften*, Berlin, 47(9):197–198, May 1, **1960.** 2 figs., 2 refs. **DLC**—After launching of Russian satellite 1958 δ2, the observatory for ionospheric research at Kühlungsborn has made observations of Faraday—fading of signals on 20 MHz to yield information about electron concentration in the ionosphere. After the theory of Faraday-fadings a method was devised by which the amount of the fading minima was represented as a function of time. For May 1958–March 1959, after 500 passings of the satellite, values for the 350–1400 Km altitude have been obtained. After elimination of daily variations, the evolution of electron concentration above the F2 maximum till 1200 Km altitude has been determined for the summer 1958 and winter 1958/59. A figure shows that below 500 Km, concentration is higher in winter than in summer, above this altitude the inverse has been stated. The authors end the article by giving some precisions about variations of ionization. *Subject Headings:* **1. Ionospheric electron density 2. Ionization gradients in ionosphere 3. Satellite ionospheric electron density measurements.**—*A. V.* Ⓢ

12.9–216 551.590.24:551.510.535:551.594.12

Setty, C. S. G. K. (*Dept. Physics, Cent. Coll. Bangalore*), **Eclipse effects on the F-layer at sunrise.** *Journal of Atmospheric and Terrestrial Physics*, London, 19(2):73–81, Oct. **1960.** 5 figs., 2 tables, 5 refs., eq. **DLC**—Eclipse effects on the F-layer at sunrise observed on Sept. 1, 1951 at Derwood, Maryland, U. S. are studied with some detail. The $h'(f)$ curves taken during the eclipse period and on control days were analyzed for $N(h)$ and $N(t)$ curves at a series of heights. The eclipse variation of N computed from the control day data does not coincide with the observed variation. However, if the assumption is made that the electron production rates on the eclipse day were about 30% higher than those on the succeeding control day the agreement between the observed and computed eclipse variations of N is improved. Further, if it is assumed that at the time of totality 30% of the radiation was unobscured; in other words, if the 30% of the radiation originates in a region beyond the visible solar disc, then the agreement between the observed and computed eclipse variations is excellent. Some solar data in favour of both these assumptions is given and its validity in the light of several other known eclipses is discussed. *Subject Heading:* **1. Eclipse effects on F layer.**—*Author's abstract.* Ⓢ

F2. AURORA

See also: **Prof. Vegard's 80th Birthday** (Hylleraas), 12.9–60.

12.9–217 551.506:551.594.5:551.590.2

Gadsden, M. and Gadsden, M. N., **A note on the analysis of seven years' visual observations of the aurora from New Zealand and Campbell Island.** *Annales de Géophysique*, Paris, 16(3):414–418, July/Sept. **1960.** 5 figs., table, 5 refs. **DLC**—The purpose of the present note is to discuss visual observations made from New Zealand and Campbell Island over a period of seven years. The results drawn from this analysis show that the all-sky camera is a better detector of auroras than a visual observer and the proximity of a large town is detrimental to the detection of auroras by visual observers. There is no variation in the occurrence of rayed auroras during a sunspot cycle, over the period from minimum to maximum, other than the variation in occurrence of high K-indices. The Dec.–Feb. maximum in occurrence of auroras, derived from all-sky camera results from Invercargill, is not confirmed by visual observations. There are two high maxima in the probability of occurrence of non-rayed

auroras observed from Campbell Island. These maxima occur in April and August, and refer to a region close to the "auroral zone." *Subject Headings:* **1. Auroral observations 2. Auroral-polar relationships 3. New Zealand 4. Campbell Island.**—*A. V.* Ⓢ

12.9–218 551.594.51:535.33

Barbier, Daniel, **L'arc auroral stable.** [The stable auroral arc.] *Annales de Géophysique*, Paris, 16(4):544–549, Oct./Dec. **1960.** 2 figs., 6 refs. French, English and Russian summaries p. 544. **DLC**—The stable auroral arc, emitted by OI 6300 Å, discovered at the Haute-Provence Observatory, has been observed 15 times at this place during 1957–1959. This arc which appears in the vicinity of 50° geomagn. latitude is stable for several hours after its formation and is in all likelihood monochromatic (oxygen forbidden red doublet 6300–6364). All the observations of the auroral arcs are described and discussed. Then the author successively examines the frequency of appearance of a stable arc, the conditions of its appearance, the process of its formation, the position and displacements, the symmetry of the stable arc and its extension over the terrestrial globe. *Subject Headings:* **1. Auroral forms 2. Auroral arc 3. Auroral spectra 4. Haute-Provence, France.**—*A. V.* Ⓢ

12.9–219 551.594.51:551.594.12:551.510.535

Campbell, Wallace H. and Rees, M. H. (*both, Univ. of Alaska*), **A study of auroral coruscations.** *Journal of Geophysical Research*, Wash., D. C., 66(1):41–55, Jan. **1961.** 14 figs., 2 tables, 40 refs., 10 eqs. **DLC**—Short period variations in the N_2^+ (0,0) auroral emission band represent 5% of the total light in the 3914 A region. These quasi-periodic coruscations have a dominant period of 6 to 10 seconds. They attain a maximum amplitude in the predawn hours and are closely related to magnetic field micropulsations and ionospheric absorption of cosmic noise. Spectroscopic triangulation showed that the variations originate in the E region of the ionosphere. The profile of the electron density associated with the aurora was found to have a maximum value of 1.1×10^6 electrons per cubic centimeter at 98 kilometers. *Subject Headings:* **1. Auroral coruscations 2. Ionospheric absorption of cosmic noise 3. Magnetic field micropulsations 4. E region.**—*Author's abstract.* Ⓢ

12.9–220 551.594.51

Davis, T. Neil (*Geophys. Inst. U. Alaska, College, Alaska*), **The morphology of the polar aurora.** *Journal of Geophysical Research*, Wash., D. C., 65(10):3497–3500, Oct. **1960.** 3 figs., 3 refs. **DLC**—Presents observations of systematic motions of the visual aurora which indicate a pattern centered about the geomagnetic pole and is fixed with respect to the sun. The main features of the pattern at the auroral zone have been determined by examining the alignment of auroral forms with data from eight all-sky cameras operated in Alaska during the IGY, 1957–1958. Horizontal motions of the aurora have been examined by cinematic projection of the film. Includes diagrams of auroral patterns. The alignment of arcs at Resolute Bay, Thule, and Alert is not suggestive of a circular or spiral inner auroral zone. The pattern presented here permits interpretation of the diurnal and latitude variations of auroral occurrence inside the auroral zone. *Subject Headings:* **1. Auroral morphology 2. Auroral patterns 3. Polar auroras.**—*E.Z.S.* Ⓢ

12.9–221 551.594.51:546.11

†Herman, L. (*Geophysical Institute, Univ. of Alaska*), **Emission spectrum of the aurora at College, Alaska.** *Annales de Géophysique*, Paris, 16(3):304–318, July/Sept. **1960.** 9 figs., table, 30 refs. French, English and Russian summaries p. 304. **DLC**—Extensive semi-quantitative measurements have been made on spectrograms obtained during the winters of 1957 and 1958 with an IGY patrol spectrograph at College, Alaska. Preliminary results concerning the H_α line and the first positive system of N_2 are given. The author examines successively the doppler shift of H_α at different atmospheric heights, comparison of OI and H lines, total flux of the H_α line, and the H_α flux and auroral plays. The data discussed seem to show that the emission of hydrogen lines is a complex phenomenon and cannot be interpreted as due to monokinetic protons supposed to be travelling along the magnetic meridian, since the radiation is spread over a considerable vertical extent of possibly many hundreds of Km. Its intensity decreases very rapidly as the altitude increases between 100 km and 500 km,

it may change by a factor of 10^3 or more. Considerable changes are expected for the ratio of intensity of the first and the second positive systems of N_2 when shorter exposure times will be used for the auroral spectra. The observed effect may be, at least partially, interpreted in terms of a change of the electron temperature with altitude. *Subject Headings:* **1. Auroral observations 2. Auroral hydrogen lines 3. Auroral intensities 4. College, Alaska.**—*A. V.* Ⓢ

12.9–222 551.594.51:546.17

Herman, L. (*Geophysical Institute, Univ. of Alaska*), **Étude spectrographique de l'aurore polaire pendant l'A.G.I. à College, Alaska.** [Spectrographic investigation of the polar aurora during the IGY at College, Alaska.] *Annales de Géophysique, Paris*, 16(4):525–543, Oct./Dec. **1960.** 12 figs., 5 tables, 14 refs. French, English and Russian summaries p. 525. **DLC**—The relative intensities of the principal radiations of the auroral spectra obtained during the 1957, 1958 and 1959 winters at College, Alaska are estimated by a quasi-quantitative method. Preliminary results are given as curves of diurnal variation and frequency of simultaneous occurrence. The ionization and excitation processes of nitrogen molecules by protons with moderate energy (20 kev) are discussed in Appendix I. The Franck-Condon principle applied to simultaneous processes of ionization and excitation is used to calculate the population of vibrational levels of the $B^2\Sigma$ state of N_2^+. The results so obtained are in good agreement with the laboratory data but in disagreement with some observations. Some pictures of characteristic or particularly interesting spectra are given in Appendix 2. *Subject Headings:* **1. Auroral spectrography 2. Auroral nitrogen bands 3. Ionization processes 4. College, Alaska.**—*Author's abstract.* Ⓢ

12.9–223 551.501.81:551.594.51

Pogorelov, V. I. and Martvel', F. E., **Nekotorye rezul'taty odnovremennykh fotograficheskikh i radiolokatsionnykh nabliudenii poliarnykh siianii.** [Some results of simultaneous photographic and radar observations of polar auroras.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 5:753–755, May **1960.** 2 tables, 3 refs. Transl. into English in the corresponding number of the English language ed. of its *Izvestiia, Bulletin of the Academy of Sciences, USSR, Geophysics Series.* **DWB, DLC**—The results of the radar observations of the polar auroras and their simultaneous photography by an automatic wide angle camera of 180°, carried out in connection with the IGY Program at the station "Roshchino" of the Institute of Atmospheric Physics of the Academy of Sciences of the U.S.S.R., are presented. The angular coordinates in the photographs were measured according to azimuth marks and angles of the place being photographed simultaneously with the aurora on every frame. The measurement procedure is described and the results of observations are presented, namely the usual auroras with yellow green color; the aurora of Nov. 11, 1958 when a red color prevailed, and data from this aurora corresponding to the period when an intense magnetic disturbance occurred. The results obtained are as follows: Auroras with radiant forms are accompanied most often by actual reception of radar signals. A high intensity of illumination of a polar aurora corresponds usually to a large signal amplitude of radio reflection except for periods of intense magnetic disturbances. No radio reflections were observed in the absence of a polar aurora. The difference of the azimuth of the most intense radio reflections in the brightest structures does not exceed 10°. Such differences do not exceed the limits of possible error. During the aurora of Nov. 11, 1958 the differences attained 20°. *Subject Headings:* **1. Polar auroras 2. Photographic observations of aurora 3. Radar observation of aurora.**—*I.L.D. and authors' conclusions.* Ⓢ

F3. AIRGLOW

12.9–224 551.506.22:535.24:551.521.326

Barbier, Daniel and Glaume, Jeanine (*both, Institut d'Astrophysique, Paris*), **Les radiations de l'oxygene 6 300 et 5 577 A de la luminescence du ciel nocturne dans une station de basse latitude.** [The oxygen radiations 6 300 and 5 577 Å of night sky luminescence at a low latitude station.] *Annales de Géophysique*, Paris, 16(3):319–334, July/Sept. **1960.** 9 figs., 14 refs. French, English and Russian summaries p. 319. **DLC**—Study of the night sky luminescence based on observations made at the station of Tamanrasset (Sahara) during the

GY (May 29, 1957 to February 3, 1960). The station was fitted with a 8-color photometer nd as from Jan. 19 to Feb. 3, 1960, observations were made by means of a rotating photometer. ll the recordings obtained with this apparatus show two intensity maxima situated at azimuths latively symmetrical about the meridian, as well with the radiation 6 300 as with the radiation 577. The only plausible explanation of the form of the recordings is that a maximum intensity ne of the 6 300 and 5 577 lines oriented nearly perpendicularly to the meridian crossed permanitly the sky at Tamanrasset at the time of observations. The authors called this line the Arc." In winter there thus exists, in the regions neighboring 23°N latitude, a zone called arc"; where the intensity of the radiations 6 300 and 5 577 is exceptionally great and where ne other radiations of the night sky are only little or not at all reinforced. In the summer the henomenon is less well known; the intensity of 6 300 and 5 577 sometimes undergoes sudden mps. It is possible that the arc is then situated more southwards and only makes short ncursions towards the North; it is also possible that it does not exist in this season and that only sporadically forms. The behavior of the arc depends on its geographical latitude, its ltitude being between 200 and 300 Kms. It does not exist at the end of the night and is little pparent at the beginning of the night. It moves about during the greatest part of the night rom North to South, the direction of displacement being reversed at the end of the night. *Subject Headings:* **1. Night sky luminescence 2. Night sky spectra variations 3. Photometric night sky measurement techniques 4. International Geophysical Year 5. Tamanrasset, Algeria.**—*A. V.* Ⓢ

12.9–225 551.521.326:546.211:541.14 551.510.535:551.594.12

†Delsemme, Armand and Delsemme, Delphine, **La raie rouge du ciel nocturne à l'équateur.** [The red line of the night sky at the equator.] *Annales de Géophysique*, Paris, 16(4):507–524, Oct./Dec. **1960.** 10 figs., 2 tables, 16 refs. French, English and Russian summaries p. 507. **DLC**—The oxygen red line of the airglow has been observed at Lwiro (2°S) for 465 hours during 148 nights between Dec. 1957 and April 1959. The observed intensities have been corrected for the contributions of the extraterrestrial light, the *OH* bands and the continuum. Contrarily to its behavior in high latitudes, the red line often goes through a bright maximum (300 Rayleighs to 900 R) around midnight. There exists a seasonal annual variation with a maximum near March and a minimum near Sept. Correlations with ionospheric data entirely confirm the nocturnal mechanism of the O_2^+ dissociative recombination in the F2 layer. They lead to an O_2 scale height of 38 km at an altitude of about 310 km, which agrees with recent atmospheric models. The surprising behavior of the red line intensities at the equator can entirely be accounted for by the F2 layer behavior. The nocturnal secondary maximum of ionization seems to belong to a whole geophysical phenomenon characteristic of the equatorial region. *Subject Headings:* **1. Airglow spectroscopy 2. Red emission line variation 3. Oxygen recombination 4. F_2 layer ionization 5. Lwiro, Congo.**—*Authors' abstract.* Ⓢ

12.9–226 551.521.326:551.510.535:535.34:546.211

Huruhata, Masaaki; Nakamura, Tsuyoshi; Tanabe, Hiroyoshi et al., *(all, Tokyo Astronomical Observatory)*, **Oxygen red line in the night airglow and ionospheric F2 region.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere and Space Research in Japan*, 13(4):283–289, **1959.** 8 figs., table, 6 refs., some eqs. **DWB, DLC**—Spectroscopic data of oxygen red line, (OI)λ6300 in the nightglow are compared with the simultaneous ionospheric information. A statistical analysis of the data shows that the intensity of the red radiation is approximately proportional to the maximum electron density in the F2 region. The height of F2 region also seems to have a secondary effect on the brightness. Since the fluctuation of observed intensities from an empirical value statistically given by f_0F2, $h'F$ and h_pF2 is appreciably great, more detailed information on the structure of F2 region would be necessary to interpret the momentary variation of the red radiation. The latitude dependency of the intensity is investigated by using the spectroscopic records at zenith distance 75° in the directions of both north and south. The southern sky at Maruyama Station is usually brighter than the northern sky. This trend is generally conspicuous during the first part of night and it diminishes towards dawn. By comparing with the ionospheric data at four stations in Japan, it has been concluded that this latitudinal effect of oxygen red line is primarily due to the latitudinal gradient of electron density in the F2 region. A sug-

gestion is given on the possible correlation of the latitudinal distribution with the geomagnetic activity. *Subject Headings:* **1. Oxygen red line 2. Night airglow 3. F2 region 4. Latitudinal electron density gradient 5. Geomagnetic activities.**—*Authors' abstract.* Ⓢ

12.9–227 551.593.55:535.34:546.211

Robley, R. (*Observatoire du Pic du Midi*), **L'émission crépusculaire et nocturne des raies 6 300–6 364 Å de OI dans la haute atmosphère.** [Twilight and nocturnal emission of the 6 300–6 364 Å lines of OI in the upper atmosphere.] *Annales de Géophysique*, Paris, 16(3):335–357, July/Sept. **1960.** 10 figs., 6 tables, 18 refs. French, English and Russian summaries p. 335. **DLC**—Results of observations of the emission in the upper atmosphere of the 6 300–6 364 Å lines of neutral atomic oxygen. The observations have been made at the Pic du Midi Observatory with a photometer of which the experimental device is described. The measurement reduction method is explained in detail. The author especially considers the twilight red emission. This analysis puts into evidence a scale height for O_2 twice as important in Winter as in Summer at the F-layer level, and the vertical transport of molecular masses is supposed to be at the origin of this scale height variation. Should this vertical transport theory be confirmed, some particularities of the twilight red lines might appear clearer and more especially the morning-evening dissymmetry as well as the seasonal effect. *Subject Headings:* **1. Twilight red lines emission 2. Oxygen lines 3. Oxygen in upper atmosphere 4. Pic du Midi Observatory, France.**—*A. V.* Ⓢ

12.9–228 551.521.326:546.33

†Potter, Andrew E., Jr. and Del Duca, Betty S. (*both, Lewis Res. Center, N. A. S. A., Cleveland, Ohio*), **Origin of the sodium airglow.** *Journal of Geophysical Research*, Wash., D. C., 65(12):3915–3923, Dec. **1960.** 2 figs., 2 tables, 47 refs., 19 eqs. **DLC**—Comparison of observed and calculated altitude distributions for the sodium airglow indicates that airglow processes involving combined sodium cannot account for the observations. It is suggested that the airglow results from collisions of neutral atomic sodium with vibrationally excited oxygen. This process can account for the observed altitude distribution and, possibly, the total intensity of the sodium airglow. *Subject Headings:* **1. Sodium airglow 2. Origin of sodium airglow.**—*Author's abstract.* Ⓢ

F4. VAN ALLEN BELT

12.9–229 551.521.64

Crawford, J. A. (*Berkeley Astronomical Dept.*), **The terrestrial radiation belts.** *Astronomical Society of the Pacific, San Francisco, Leaflet*, No. 369, March **1960.** 8 p. fig. **DLC** (QB1.A422)—An interesting discussion of the various features of the recently discovered Van Allen radiation. The most puzzling and striking characteristic of the Van Allen radiation is the existence of two distinct zones or belts. The gap between the two zones and the existence of the outer and inner belts are discussed. Since the features of the outer belt are more puzzling than those of the inner belt, the former is discussed first and at somewhat greater length. *Subject Heading:* **1. Van Allen belts.**—*I.S.* Ⓢ

12.9–230 551.521.64:537.5:550.38:523.745

Bailey, V. A. (*Univ. Sydney, Australia*), **A unified theory of terrestrial and solar magnetization, the outer Van Allen belt and high energy primary cosmic rays.** *Journal of Atmospheric and Terrestrial Physics*, London, 18(2/3):256–257, June **1960.** 6 refs. **DLC**—This short paper refers to a paper (*see* 7.10–18, Oct. 1956, **MAB**) published by CHATTERJEE (1956). Chatterjee presented facts and arguments in an effort to supply the basis for an acceptable theory of the Earth's state of magnetization. His conclusion was that a separately produced field of 0.01 G may suffice to account for the known magnetization of the Earth. This suggested the problem of finding the source of this field and its required direction. This problem is the subject of the present paper. It is concluded that this source is the sun and its motion with velocity 30 Km/sec relatively to that of the Earth in its orbit. The facts leading to this conclusion are discussed. *Subject Headings:* **1. Terrestrial magnetism 2. Van Allen belts 3. Primary cosmic rays 4. Solar magnetism.**—*I.S.* Ⓢ

12.9–231 551.521.64:550.385.4

Farley, T. A. and Rosen, A. (*both, Space Tech. Lab., Los Angeles, Calif.*), **Charged-particle variations in the outer Van Allen zone during a geomagnetic storm.** *Journal of Geophysical Research*, Wash., D. C., 65(10):3494–3496, Oct. 1960. 3 figs., 7 refs. **DLC**—A note discussing the charged-particle variations in the outer Van Allen zone during a geomagnetic storm. The geomagnetic storm's sudden commencement began about 0400 GMT on Aug. 16, 1959 and was associated with intense and unusual fluctuations in the particle intensity measured by the Space Technology Laboratories scintillation counter on the Explorer VI earth satellite. Comparison of these data with a spin coil magnetometer on the same vehicle has revealed a 180° out-of-phase correlation between the particle intensity and the magnetic field strength. The storm was also accompanied by an increase in the count rate of the scintillation counter in the outer zone within 12 hrs after the sudden commencement, whereas other radiation instruments on the satellite, sensitive to bremsstrahlung from electrons saw a decrease. Observations indicate that there is a magnetic field associated with the particles seen by the scintillation counter which is capable of substantially reducing the geomagnetic field at that distance. The particles seen by the scintillation counter at this time may be either electrons or protons. Since the instrument on the satellite sensitive to bremsstrahlung from electrons saw a decrease in peak intensity, the increase in peak intensity seen by the scintillation counter must be the result of an increase of protons above 2 Mev in the geomagnetic field. *Subject Headings:* **1. Van Allen belts 2. Geomagnetic storm effects on cosmic rays.**—*E.Z.S.* Ⓢ

12.9–232 551.510.536:551.521.64

Inoue, Y. (*Tech. Res. Inst. Nat'l Def. Ag., Tokyo, Japan*), **Physical properties in the outer Van Allen belt and their relations to the phenomena in the exosphere.** *International Space Science Symposium, Nice, Jan.* 1960, *Space Research: proceedings of the First Symposium.* Pub. 1960. p. 828–840. 7 figs., table, 10 refs., 14 eqs. Russian summary p. 828. **DWB** 523.2 I61sp)—On the basis of observed data on corpuscular radiation in the exosphere, the electron temperature and density in the outer Van Allen belt are estimated. The electron temperature is 2.4×10^{8}°K, the total electron density is 3.5×10^{2} cm^{-3}, and the mean kinetic energy of electrons is 32 keV. The estimated total electron density is in precise agreement with the ion-density measured with the U.S.S.R. moon rocket (Jan. 2, 1959) in the exosphere. The time of replacing old particles with new particles in the outer Van Allen belt is estimated to be 73 years. Electrons and protons trapped in the exosphere leak into the auroral zones as auroral particles. The estimated average flux of auroras particles is 1.4×10^{6} particles cm^{-2} sec^{-1}. The total flux over the active region is 3.6×10^{3} ($4\pi R^2\oplus$) particles sec^{-1}. The volume of the exosphere that contributes to the flux of auroral particles is 1.1×10^{2} ($4/3\pi R^3\oplus$). Local equilibrium is maintained between the mechanical force from the electric current and the pressure gradient. The pressure and pressure gradient are derived. *Subject Headings:* **1. Corpuscular radiation 2. Outer Van Allen belt 3. Exosphere 4. Auroral particles 5. Electron densities in Van Allen belt.**—*Author's abstract.* Ⓢ

F5. COSMIC RAYS

See also: **Swedish-Finnish-Swiss N.E. Land Exped.** (Liljequist), 12.9–38; **Geomag. auroral cosmic rays and solar activity** (Mariani, Molina), 12.9–177; **Solar flares and cosmic rays** (Sakurai), 12.9–179; **Cosmic ray impact on meteorites** (Geiss, Oeschger), 12.9–194; **Cosmic ray investig. on lunar space rocket** (Kurnosova), 12.9–250; **Satellite cosmic ray obs.** (Vernov, et al.), 12.9–252, 12.9–353, 12.9–254, 12.9–255.

12.9–233 551.521.67:551.521.64:551.507.362.2

Arnoldy, R. L.; Hoffman, R. A. and Winckler, J. R. (*all Univ. Minnesota*), **Solar cosmic rays and soft radiation observed at 5,000,000 kilometers from earth.** *Journal of Geophysical Research*, Wash., D. C., 65(9):3004–3007, Sept. 1960. fig., table, 7 refs. **DLC**—The observed phenomena are analyzed on the basis of results obtained by Pioneer V, Explorer VI and VII, and a balloon flight at Minneapolis on April 1, 1960. Among significant facts emerging from the comparison of observations, the solar proton fluxes are in reasonable agreement with cosmic ray-event. A large initial decrease in the outer radiation zone at

1000 km altitude was followed by a very large increase during the following week. The increase in electron flux may have reached $10^{11}/cm^2$ sec in the 50-kw range while a flux of similar energy electrons greater than $10^7/cm^2$ sec was never observed before. It is assumed that the energetic part of the outer zone arises from a local acceleration process within the confines of the geomagnetic field itself. A comparison of different observations is shown on diagram and rate increases observed in Pioneer V are represented on the table. *Subject Headings:* **1. Solar proton radiation 2. Cosmic ray variations 3.Satellite cosmic ray data.**—*O.T.* Ⓢ

12.9–234 551.547:551.521.64:550.385.4

Bartha, Lajos, Jr., **A kozmikus sugárzás kapcsolata a 100 mb-os szint magasságával és a naptevékenységgel.** [Relation of cosmic radiation to the height of the 100 mb level and to solar activity.] *Időjárás*, Budapest, 63(2):110–111, March/April **1959.** 2 figs., 12 refs. **DLC**—The often 1–3 days delay of the minimum intensity of cosmic rays after the strongest magnetic disturbances is explained by the negative correlation of radiation intensity at the surface and at 100 mb level altitude at around 16 km. The sun's corpuscular radiation invading the atmosphere, could lift the 100 mb level by heating it, and causing a decrease of cosmic radiation. This decrease could be effected also by an increase of solar radiation via the high atmosphere. This effect had been ascertained during the strong magnetic disturbances of Jan. 21, Feb. 11, and April 17, 1958. The intensity of cosmic radiation in relation to the 100 mb stratum, and the oscillation of magnetic storms as observed in Moscow Jan. 19–28, and Feb. 8–18, are shown on diagrams as well as the oscillation of cosmic radiation, the 100–200 mb strata, and the magnetic disturbances between April 15–22, 1958 in Moscow and Budapest. The radiation-minimum and the level-maximum occurred in Moscow earlier than in Budapest, confirming GEORGE PECZELY's finding that the atmospheric rise in temperature is extending toward lower latitudes gradually. *Subject Headings:* **1. Magnetic effects on cosmic rays 2. Cosmic ray decreases 3. Pressure effects on cosmic rays.**—*O.T.* Ⓢ

12.9–235 551.521.64:550.385.4

Carmichael, H. and Steljes, J. F. (*both, Physics Div., Atomic Energy of Canada Limited, Chalk River*), **Unusual cosmic-ray fluctuations on July 17 and 18, 1959.** *Physical Review Letters*, 3(8):392–394, Oct. **1959.** 3 figs., 5 refs. **DLC**—The unusual features exhibited by the third of large Forbush decreases between July 11 and July 18, 1959, which coincided with a magnetic storm on July 17, are discussed and graphically represented. One unusual feature noted is the occurrence of three very rapid changes in intensity, which is difficult to account for on the basis of existing theories of the modulation of cosmic radiation. Another unusual effect observed is the marked increase of intensity, beginning on July 17. *Subject Headings:* **1. Cosmic ray variations 2. Magnetic effects on cosmic rays.**—*I.S.* Ⓢ

12.9–236 551.521.64

Chitnis, E. V.; Sarabhai, V. A. (*both, Physical Res. Lab., Ahmedabad, India*) and Clark, G. (*M. I. T.*), **Arrival directions of cosmic-ray air showers from the equatorial sky.** *Physical Review*, N. Y., 119(3):1085–1091, Aug. **1960.** 7 figs., table, 5 refs. **DWB**—The celestial arrival directions of over 100,000 showers with sizes greater than 10^5 particles have been determined by fast timing in observations at an altitude of 2034 m. The observations covered a band of declinations from $-30°$ to $+50°$ with an angular resolution of 4°, and they extended a survey begun in an earlier experiment that covered the northern sky. As in the earlier experiment no significant deviation from isotropy was found. The atmospheric attenuation of the shower intensity was determined from the zenith angle distribution, and also from a comparison of the absolute shower intensity of 2034 m and at sea level. Within an experimental uncertainty of about 5%, both methods yield an exponential attenuation length consistent with the value of 107 g cm^{-2} previously found at sea level. The absolute intensity of showers with more than 10^5 particles at 2034 m was found to be $(1.11 \pm 0.30) \times 10^{-9}$ cm^{-2} sec^{-1} sr^{-1}. *Subject Heading:* **1. Cosmic ray showers.**—*Authors' abstract.* Ⓢ

12.9–237 551.521.64:551.507.362.1

Dawton, D. I.; Quenby, J. J. and Elliot, H., **Cosmic ray measurements in Australia at rocket altitudes (abstract only).** *International Space Science Symposium, Nice, Jan.* 1960

pace Research: proceedings of the First Symposium. Pub. 1960. p. 967. Russian summary 967. **DWB** (523.1 161sp)—A single Geiger counter has been used to carry out a preliminary rvey of the variation of cosmic ray intensity with height above Woomera, Australia. The unter is halogen quenched and operates at 360 volts with an efficiency for detecting ionizing rticles of 90%. It was carried in the nose of a Black Knight rocket launched on Oct. 30, 959 and the scaled pulse output was telemetered on both the upward and downward sections the flight. The trapped radiation belt was not reached, but the cosmic ray intensity was und to increase by 65% between the altitudes 100 km and 750 km. The Störmer cone giving e allowed directions for the arrival of primary particles of a given energy at a point inside e earth's magnetic field varies in size with the altitude of observation. If we take into count the altitude dependence of both the Störmer cone and the geometrical shadow of the rth, the observed increase with altitude of the cosmic ray intensity can be explained. The rm of primary spectrum assumed is a negative power law in particle magnetic rigidity. ood agreement is obtained between the observed and calculated altitude dependence when value of 2 is used for the differential power law exponent in the 3 GV to 10 GV rigidity range. *ubject Headings:* **1. Cosmic ray measurements 2. Rocket radiation measurements Woomera, Australia.**—*Authors' abstract.* Ⓢ

12.9–238 551.521.64:551.557:551.507.321

Hopper, V. D. and Laby, Jean E. (*both, Univ. Melbourne*), **High altitude studies with eteorological balloons.** *Beiträge zur Physik der Atmosphäre*, Frankfurt a.M., 32(3/4):237–48, 1960. 10 figs., 2 tables, 2 refs., 5 eqs. German, English and French summaries p. 237. **WB, DLC**—This paper describes a method for obtaining level flights with valve operated eteorological balloons. Experimental details are given and the method has been applied r cosmic ray experiments at high altitudes as well as to study winds at levels higher than rmally reached with the same balloons without valves. High altitude wind measurements Australia and South Africa are discussed. *Subject Headings:* **1. Cosmic ray events at high ltitude 2. High level wind measurement techniques 3. High altitude balloons.**—*Authors' bstract.* Ⓢ

12.9–239 523.164.82:551.521.64:550.385.4 551.521.64:550.385.4:621.396.8

Obayashi, Tatsuzo and Hakura, Yukio (*both, Radio Res. Lab., Japan*), **Propagation of olar cosmic rays through interplanetary magnetic field.** *Journal of Geophysical Research*, Vash., D. C., 65(10):3143–3148, Oct. 1960. 2 figs., 2 tables, 20 refs. **DLC**—In recent years vidence has been accumulating that low-energy solar cosmic-ray particles arrive at the earth fter intense solar disturbances. The time-delay of polar-cap absorptions and of geomagnetic torms, which follow after an intense solar radio outburst of type IV, indicates that solar cosmic-ay particles originating to the west of the solar central meridian reach the earth earlier and nore easily than those from the east. The model of the interplanetary magnetic field, which nay be appropriate for the explanation of this evidence, is as follows: the interplanetary nagnetic field is formed by the outward-streaming solar winds which carry the imbedded solar nagnetic fields and the lines of force also linked with the sun itself. The rotation of the sun roduces a curvature of streams and consequently of the lines of force, which are convex toward he west. Since the injected solar particles will tend to travel along the existing magnetic ines of force, this model explains the western excess of the arrival of solar cosmic rays as well s the inequality of their travel time with respect to the heliographic position. The estimated ntensity of the magnetic field is of the order of 10^{-3} to 10^{-5} gauss near the earth's orbit. *Subject Headings:* **1. Solar cosmic ray propagation models 2. Cosmic ray paths 3. Inter-planetary magnetic field 4. Magnetic effects on cosmic rays.**—*Author's abstract.* Ⓢ

12.9–240 551.521.64:551.594.12

Ogilvie, K. W. and Winn, M. M. (*both, School of Physics, Univ. of Sydney*), **Evidence for cosmic ray energy spectrum changes during a Forbush decrease.** *Nature*, London, 184(4690), Supp. No. 12:888–889, Sept. 19, 1959. fig., eq. **DWB**—A note on the multiplicity of neutron production in a conventional neutron monitor. To study the changes in multiplicity one half of the Sydney neutron monitor, during the Forbush decrease which started on May 10, was connected to a scaler with a paralysis time of 500μsec as well as to the conventional recorder.

The operation of the second scaler is explained. The daily values and the monitor counting rate are graphically represented. It is concluded that the multiplicity of neutron production in a conventional neutron monitor might be expected to be determined by the spectrum of incident particles. *Subject Headings:* **1. Cosmic ray energy spectrum 2. Cosmic ray neutrons 3. Forbush cosmic ray decreases 4. Sydney, Australia.**—*I.S.* Ⓢ

12.9–241 551.521.64

Parsons, N. R. (*Fyiska Inst., Uppsala*), **Phase changes in the daily variation of the cosmic ray nucleonic component.** *Tellus*, Stockholm, 12(4):450–462, Nov. **1960.** 8 figs., 3 tables, 7 refs. **DLC**—Results of the analysis of solar daily variations in the cosmic ray nucleonic component at nine stations during the IGY are presented. Examination of month to month phase behavior leads to the conclusion that there is an important component variation synchronized in Universal Time at all stations, and its origin is discussed. Its effects on inferences about the primary anisotropy responsible for the main part of the daily variation and on various characteristics of the observed variation are also discussed. *Subject Headings:* **1. Cosmic ray nucleonic components 2. Seasonal cosmic ray variations.**—*Author's abstract.* Ⓢ

12.9–242 551.521.64:550.383.2

Pomerantz, Martin A.; Potnis, Vasant R. (*both, Swarthmore, Pa., Franklin Inst.*) and Sandström, Arne E. (*Uppsala Univ., Sweden*), **The cosmic-ray equator and the earth's magnetic field.** *Journal of Geophysical Research*, Wash., D. C., 65(11):3539–3543, Nov. **1960.** 3 figs., table, 12 refs. **DWB, DLC**—The positions of the cosmic-ray intensity minimum off the west coast of Africa and in the Indian Ocean, respectively, have been determined from measurements obtained with a shipboard neutron monitor during two voyages between Scandinavia and Australia. The cosmic-ray equator is in accordance with the prediction based upon calculations of modified cutoff rigidities at the first location, but differs by 4° at the second. Contemporary observations of zero magnetic dip indicate that the cosmic-ray intensity minimum coincides with the dip equator at 14°W, but differs in geographic latitude by 2° in the vicinity of 60°E. *Subject Headings:* **1. Cosmic ray intensities 2. Equatorial dip in cosmic radiation 3. Earth's magnetic field 4. Magnetic effects on cosmic rays.**—*Authors' abstract.* Ⓢ

12.9–243 537.59

Powell, C. F. (*University of Bristol*), **Cosmic radiation.** *Institution of Electrical Engineers, London, Proceedings, Pt. B*, 107(35):389–394, Sept. **1960.** 5 figs. (The fifty-first Kelvin lecture.)—Cosmic radiation consists of a thin rain of energetic charged particles coming out of space and impinging on the high atmosphere. In order to speculate about their origin it is necessary to determine their energy spectrum. This has been done using stacks of sheets of photographic papers carried aloft by high-altitude balloons. The passage of an energized particle through such a stack leaves a trace of the sheets of photographic emulsions. While the energy spectrum contains many similarities to that of the spectra of the stars and sun there are sufficient differences to doubt whether the cosmic rays do emanate from such sources. It is suggested that the most likely source of the cosmic rays are the super-novae. A description of the formation of these super-novae is given with particular references to the study of the Crab Nebula. *Subject Heading:* **1. Cosmic radiation.**—*R.B.* Ⓢ

12.9–244 551.521.64

Sandström, Arne Eld; Eyring, Eric and Lindgren, Stig (*all, Univ. of Uppsala, Sweden*) **The daily variation of the cosmic ray nucleonic component at Murchison Bay and Uppsala.** *Tellus*, Stockholm, 12(3):332–347, Aug. **1960.** 15 figs., 3 tables, 25 refs., 3 eqs. **DWB**—In both places the monitors were of the standard pattern with 12 proportional counters filled with 97% enriched $B^{10}F_3$. The first and second harmonics of the mean daily variation have been determined both for yearly periods and for each sun rotation period. Vector sum diagrams for the first harmonics in the latter case are given covering the intervals 31 Aug. 1956 to 15 Aug. 1959 for Uppsala and 13 Sept. 1957 to 29 April 1959 for Murchison Bay. In some instances a considerable phase shift has taken place from one sequence of sun rotation periods to another. These phase shifts were not contemporary at the two stations. The first harmonic of the 12-month means displays a high degree of constance with only a small secular phase

ift. The amplitudes of the second harmonics are very small. Conditions are especially vorable concerning the deviation in the earth's magnetic field of the particles registered by e Murchison Bay monitor. Accordingly it has been possible to determine the direction of e anisotropy with a fairly good accuracy. The Murchison Bay records do not show any ominent phase shift with the K_p index. Concerning the Uppsala, days with $(K_p)_{max} \leqslant 1^+$ ve a late time of maximum than other days. The influence of single days with an abnormal ily variation is discussed. *Subject Headings:* **1. Cosmic ray monitoring 2. Murchison Bay, itsbergen 3. Uppsala, Sweden.**—*Authors' abstract.*

12.9–245 551.521.64:537.5

†Simpson, J. A. (*Enrico Fermi Inst. for Nuclear Studies and Dept. of Physics, Univ. of icago*), **Variations of solar origin in the primary cosmic radiation.** *Astrophysical Journal, ppl. Ser.*, Chicago, 4(44):378–405, June **1960.** 18 figs. (incl. photo), 33 refs. **DLC**—The idence for acceleration of particles in the solar system and galaxy is reviewed in the light of cent studies of high-energy solar-flare particles. Also reviewed are experiments and obrvations of changes in intensity, composition, and spectrum of the galactic cosmic radiation low energies which provide the evidence for electromagnetic fields in interplanetary space solar origin. Figures summarize the model and results showing the following: the spectra energetic particles observed in the Solar System; a photograph of the solar flare of Feb. 23, 956; the intensity increase of secondary neutrons generated in the atmosphere from primary lar-flare protons-time sequences-time spread or dispersion effect; a simplified theoretical odel; comparison of calculated results of diffusion with experimental observations; the ectrum of non-relativistic protons from the sun measured in photonuclear emulsions by ey et al. A flow chart shows the development of secondary components of the cosmic diation in the atmosphere from primary cosmic ray particles, and Forbush Intensity decrease. *ubject Headings:* **1. Solar cosmic ray propagation models 2. Primary cosmic ray intensities.** *-E.Z.S.* Ⓢ

12.9–246 537.59

Wilson, J. G. (*Leeds Univ.*), **Cosmic radiation: the primary particles.** *Contemporary hysics*, London, 1(3):204–219, Feb. **1960.** 2 figs., 2 refs.—Observations of primary cosmic ay particles entering the upper atmosphere show that the solar system is situated in an otropic flow of protons and of heavier nuclei, and that these particles carry energy which can ary from small values to values so great that we cannot at present define the upper limit of nergy carried by a single particle. These primary particles are constrained to diffuse through ne galaxy as if in a reservoir from specific sources. In many ways the turbulent clouds which emain at the site of eruption of supernovae meet the requirements of such sources, and this roperty can be related to the identification of these objects as sources of strong radio-emmision or radio-stars. *Subject Heading:* **1. Primary cosmic rays.**—*Author's abstract.* Ⓢ

F6. RADIOASTRONOMY

See also: **Solar radiowaves and solar-Terr. relationships** (Simon), 12.9–174; **Jupiter as radio source** (Franklin), 12.9–187; **Whistlers,** 12.9–201 to 12.9–207.

12.9–247 522.2:621.396.663:523.852(470)

Apushkinskiĭ, G. P. and Pariiskiĭ, Iu. N. (*both, Acad. Scien., U.S.S.R.*), **Observations f the Crab nebula with the large radio telescope of the Pulkovo Observatory.** *Soviet Astronomy AJ*, New York, 3(4):717–718, Jan./Feb. **1960.** 2 figs., 6 refs. **DLC.** Transl. of riginal Russian in *Astronomicheskiĭ Zhurnal*, Moscow, 36(4):739–740, July/Aug. **1959.** **DLC**—Results of preliminary observations of the Crab nebula on 3 cm are reported. The bservations were carried out at the Pulkovo Observatory using a high resolution radio telecope. The angular dimensions, the coordinates of the effective center of radio emission, and he asymmetry of the source were determined. *Subject Headings:* **1. Crab nebula 2. Radio mission from nebulae 3. Pulkovo Observatory, U.S.S.R.**—*Author's abstract.* Ⓢ

12.9–248 621.396.8:523.165:551.510.535

Lusignan, Bruce (*Stanford Univ., Calif.*), **Cosmic noise absorption measurements at Stanford, California, and Pullman, Washington.** *Journal of Geophysical Research*, Wash., D. C., 65(12):3895–3902, Dec. **1960.** 7 figs., 9 refs. **DLC**—Results of cosmic noise absorption measurements at 27.5 Mc made at Stanford, California and Pullman, Washington, during 1958 are presented. A method introduced by MITRA and SHAIN of extracting F-layer absorption from total absorption and an extension of this method to remove D-layer absorption are described. Subtracting these two components from the total absorption leaves an extra component of absorption. The diurnal and annual variation of all these components is presented graphically and discussed. Errors in the cosmic noise curves are discovered and corrected for. The cause of these errors and its relation to assumptions of the cosmic noise absorption method is discussed. *Subject Headings:* **1. Cosmic noise absorption measurements 2. Cosmic noise absorption in ionosphere 3. Ionospheric absorption 4. Stanford, Calif. 5. Pullman, Washington.**—*Author's abstract.* Ⓢ

12.9–249 551.510.535:551.521.64:621.396.8

Dowden, R. L. (*Commonwealth Ionospheric Prediction Service, Hobart, Tasmania*), **Geomagnetic noise at 230 kc./s.** *Nature*, London, 187(4738):677–678, Aug. 20, **1960.** fig., 6 refs. **DWB**—Describes the geomagnetic noise at 230 kc/s. The observations were made during mid Sept. to mid Nov. 1959. The geomagnetic noise was recorded only on Oct. 31, Nov. 3 and Nov. 6. A probable mechanism for this noise is Čerenkov radiation from small clouds of charged particles travelling through ionosphere and exosphere. The intensity produced at 230 kc/s. is ten times that of 9 kc/s. Also 230 kc/s. will be attenuated by eight times as many decibles as 9 kc/s. *Subject Headings:* **1. Geomagnetic noise 2. Čerenkov radiation 3. Ionosphere 4. Exosphere.**—*A.H.K.* Ⓢ

F7. SATELLITES

See also: **Space station lunar photography** (Blagonravov), 12.9–189; **IGY micrometeorite meas.** (Dubin), 12.9–193; **Ionos. electron content and distrib. from satellite obs.** (Garriott), 12.9–209; **Satellite met.** (Widger), 12.9–275.

12.9–250 551.507.362.1:551.521.64

Kurnosova, L. V.; Logachev, V. I.; Razorenov, L. A. et al., **Issledovanie kosmicheskikh lucheĭ pri polete vtoroĭ kosmicheskoĭ rakety na Lunu.** [Cosmic ray investigations during the flight of the second space rocket to the moon.] *Iskusstvennye Sputniki Zemli*, Moscow, No. 5:30–37, **1960.** 4 figs., table, 6 refs. **DLC.** Transl. as **Cosmic ray investigation by the second cosmic rocket landed on the Moon** in *International Space Science Symposium, Nice, Jan. 1960. Space Research: proceedings of the First Symposium.* Pub. **1960.** p. 852–862. 4 figs., table, 6 refs. Russian summary p. 852. **DWB** (523.1 161sp)—The registration of the nuclear components of the cosmic rays in the second space rocket is discussed with details and description of the ČERENKOV's counters of (α) particles and of other charged nucleuses. The counters were calibrated in the laboratory before placing them in the rocket and the values of their capacities and characteristics of filtration of the nucleuses of different energy are described in the text. The non-stability of the external earth radiation belt was found by means of the indicator of the radiation intensity. The distribution of the intensity determined by both rockets varies differently with the distance from the earth. Their maxima were also different by the magnitude and location from the earth, as is illustrated on the chart. The intensity of protons in the cosmic rays neither changes outside of the earth radiation belt nor in approaching the moon, as the records indicate. The counting and analysis of distribution of various nuclear components of the cosmic rays with respect to distance from the earth are discussed in the text with tabulated data and charts for the integral energy spectrum of the (α) particles and nuclear groups of the *C*, *N*, *O* and *F*. The author could not give preference to any discussed interpretations of the observed effects, however, there is shown definite effect of high intensity radiation in the earth's radiation belt and the effects of accumulation of the (α) particles and other nucleuses in the earth orbits. *Subject Headings:* **1. Soviet space probe, Lunik II 2. Cosmic ray investigations 3. Cosmic ray variations. I. Fradkin, M. I.**—*N.P.S.* Ⓢ

12.9–251 551.507.362.1:551.521.64

Shafer, Iu. G. and Iarygin, A. V., **Izmerenie kosmicheskikh luchei na geofizicheskikh rakete.** [Cosmic ray measurements on geophysical rockets.] *Iskusstvennye Sputniki Zemli*, Moscow, No. 4:184–194, **1960.** 7 figs., table, ref., 8 eqs. **DLC**—The author describes the instrumentation of a geophysical rocket for measuring the global intensity of cosmic radiation by means of halogenic counters and ionization chambers. The hermetically sealed section of the rocket containing the instrumentation, the installation of the counters, the instruments themselves and their operation are described with the aid of a photograph and circuit diagrams. The data on the dependence of global intensity of cosmic radiation upon height obtained in the course of a rocket released July 2, 1958 are presented and analyzed. The mean specific ionization of primary rays in 1 cm^3 of argon is under normal pressure $j = 260 \pm 19$ pairs of ions m^{-3} sec^{-1}. This value exceeds by 1.8 times the mean ionization of charged relativistic particles. The specific ionization on 1 cm of path in argon is under normal pressure equal to 89.1 ± 8.20 m^{-1}. *Subject Headings:* **1. Cosmic ray measurement instruments 2. Geophysical rockets 3. Ionization of primary rays 4. Ionization of charged relativistic particles.**—*I.L.D.* Ⓢ

12.9–252 551.507.362.2:551.521.64

Vernov. S.; Ginzburg, V. L.; Kurnosova, L.; Razorenov, L. and Fradkin, M., **Issledovanie sostava pervichnogo kosmicheskogo izlucheniia.** [Study of the composition of primary cosmic radiation.] *Uspekhi Fizicheskikh Nauk*, Moscow, 63(1b):131–148, Sept. **1957.** 7 figs., 1 tables, 48 refs. **DLC**—It is a review article largely concerned with the value of an artificial earth satellite as a means to taking observations on the energy spectrum of high-energy particles. A table summarizing current information on the α-particle stream in primary cosmic radiation is given. *Subject Headings:* **1. Satellite cosmic ray observation techniques 2. Primary cosmic rays.**—*Physics Abstracts*, 6015, 1958.

12.9–253 551.507.362.2:550.385:551.521.64

Vernov, S. N.; Logachev, Iu. I.; Chudakov, A. E. and Shafer, Iu. G., **Issledovanie variatsii kosmicheskogo izlucheniia.** [Investigation of the variations of cosmic radiation.] *Uspekhi Fizicheskikh Nauk*, Moscow, 63(1a):149–162, Sept. **1957.** 5 figs., 12 refs. **DLC**—The following topics are discussed: variations of primary cosmic radiation; variations of multiply-charged components; the geomagnetic field at great distances from the earth and its effect on cosmic radiation and the structure of the streams emitted by the sun, etc. The use of an artificial satellite to study these and other phenomena is discussed. Also considered is the design of a simple apparatus, consisting essentially of the counter and ionization chamber, to be incorporated in a satellite for such studies. *Subject Headings:* **1. Satellite cosmic ray recorders 2. Cosmic ray variations.**—*Physics Abstracts*, 5098, 1958.

12.9–254 551.507.362.2:551.521.64

†Vernov, S. N., Ginzburg, V. L. et al. (*Moskva Akademiia Nauk SSSR*), **Izuchenie pervichnogo kosmicheskogo izlucheniia s isopl'zovaniem iskusstvennogo sputnika zemli.** [Study of the primary cosmic radiation by using artificial satellites of the earth.] *International Astronautical Congress, Proceedings of the 8th Congress, Barcelona*, 1957, issued Vienna, **1958.** p. 464–477. 7 figs., 49 refs. English summary p. 475–476. **DLC** (TL787.144)—Cosmic-ray time variations and the charge-spectrum of the primary cosmic rays are the problems which attract attention. The artificial satellite will offer new possibilities for the investigation of the primary nuclear component. Instruments should permit one to gather statistical data necessary for determining low intensity fluxes of the primary nuclei. The report outlines a method for investigation of charge-spectra based on the Vavilov-Čerenkov effect. The cosmic-ray recording apparatus may also be used to investigate a number of other problems: to measure the primary proton flux, to ascertain the role of the albedo of the Earth's atmosphere, etc. Instruments should also yield information on variations of the primary cosmic-ray intensity. *Subject Headings:* **1. Satellite cosmic ray observation techniques 2. Primary cosmic rays. I. Kurnosova, L. V. II. Razorenov, L. A. III. Fradkin, M. I.**—*E.K.*

12.9–255 551.507.362.2:551.521.64

Vernov, S. N.; Grigorov, N. I. et al., **Izmerenie kosmicheskogo izlucheniia na iskusstvennom sputnike Zemli.** [Artificial satellite measurements of cosmic radiation.] *Akademiia Nauk SSSR, Doklady,* 120(6):1231–1233, **1958.** 4 figs., 3 refs. **DLC.** Also issued in *Iskusstvennye Sputniki Zemli,* Moscow, No. 1:5–8, **1958.** 4 figs., 3 refs. **DLC.** Transl. into English by E. R. Hope, issued as *Canada. Defence Research Board, Translation* T-305-R, Sept. **1958. DWB.** Transl. into English in *Artificial Earth Satellites,* N. Y., Plenum Press, **1960.** Vol. 1:5–9. 4 figs., 3 refs. **DWB**—Reports preliminary results furnished by the second earth's satellite's two identical, but independent instruments for measuring cosmic radiation. In the ascending passes (from south to north) the satellite's altitude was close to constant (225–270 km). In the descending passes its altitude increased from 350 to 700 km. The experiment lead to the following conclusions: a) the ratio of cosmic ray intensity in the descending passes to the intensity on the ascending passes at the same geographical points expresses the relative increase of intensity due to difference in height; b) it is possible to construct lines of equal intensity for the cosmic radiation (isocosms); c) considerable increase of cosmic ray intensity was sometimes observed. *Subject Headings:* **1. Satellite cosmic ray observation techniques 2. Cosmic ray height distribution. I. Logachev, Iu. I. II. Chudakov, A. E.**—*E.K.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION (551.501)

See also: **First Weather Reconnaissance Symposia** (U. of Michigan), 12.9–3; **U. S. Air Weather Service 433L System manual** (U. S. Electronic Support System Proj. Off.), 12.7–14; **Weather analysis manuals** (G.B.M.O.), 12.9–15; **Radiation balance—Arctic** (Gavrilova), 12.9–26; **Vostok IGY station—1957** (Teterin), 12.9–34; **Centenary Celebrations—Ross-on-Wye Observ.** (Glasspoole), 12.9–55; **Radar echo enhancement** (Schuetz), 12.9–104; **Radar echoes from mesosystems** (Fujita, Brown), 12.9–105; **Radar studies of met. "angel" echoes** (Atlas), 12.9–106; **Radar invest. of cumulus rainclouds** (Sal'man), 12.9–107; **Snow melt calculations—Kama River** (Lebedeva), 12.9–125; **Spread-F and latitude variation of whistlers** (Singleton), 12.9–206; **Electron density from whistler date and Faraday-fading obs.** (Schmelovsky), 12.9–207; **Simultaneous photographic and radar obs. of auroras** (Pogorelov, Martvel'), 12.9–223; **Aerial reconnaissance of hurricanes** (Jordan), 12.9–323; **Met. significance of meas. of infra-red emission** (Houghton) 12.9–336; **Evap. from vegetation—Penman formula** (Makkink) 12.9–365; **Calculation of potential evapotranspiration** (Rijtema), 12.9–366; **Calculation of evap.** (Wesseling), 12.9–369; **Drop size distrib. measurements** (Nikandrova, Fridman), 12.9–374; **Showers on radar—Berlin** (Malkowski), 12.9–380; **Precip.—Zakopane, Poland** (Chomicz), 12.9–390; **Snow study lab.—Porte Pass, Isère, France** (Garavel, Poggi), 12.9–402; **Horiz. transparency of atmos.** (Gavrilov), 12.9–433.

12.9–256 551.501:551.55:517.91

Vetlov, I. P., **O vychislenii proizvodnykh meteorologicheskikh elementov.** [Computation of the derivatives of meteorological elements.] *Meteorologiia i Gidrologiia,* Leningrad, No. 1:29–33, Jan. **1960.** 3 figs., 3 refs., 17 eqs. **DWB, DLC**—In obtaining actual values of derivatives during computations of finite differences a small interval is usually selected. Depending upon the scale of atmospheric disturbances it is always possible to choose an interval for which the increase is greater than its random fluctuations. The probable error resulting from irregular wind fluctuations can be reduced substantially if a large number of wind data are used to determine the derivatives. The formulas

$$\frac{\delta f}{\delta x} = \frac{\delta f}{\delta s}\cos\alpha - \frac{\delta f}{\delta n}\sin\alpha \qquad \text{and} \qquad \frac{\delta f}{\delta y} = \frac{\delta f}{\delta s}\sin\alpha + \frac{\delta f}{\delta n}\cos\alpha$$

are used; they establish a relationship between the partial derivatives of functions $f(x, y)$ along x and y and the partial derivatives of this function along two other mutually perpendicular

ections s and n (α = angle between directions s and axis x). By calculating $\frac{\delta f}{\delta x}$ and $\frac{\delta f}{\delta y}$ for erent directions of the axis s and n it is possible to find their values for a given point. The hmetical mean of the values is the most probable value of $\frac{\delta f}{\delta x}$ and $\frac{\delta f}{\delta y}$. Equations are ived for calculating $\frac{\delta f}{\delta x}$ and $\frac{\delta f}{\delta y}$ for 8 points, for 12 points and for 24 points of a square grid. the assumption that the mean errors of f depending upon random causes are equal, the hor calculated the accuracy of $\frac{\delta f}{\delta x}$ and $\frac{\delta f}{\delta y}$ for the varying number of grid points. In order utilize the proposed formulas for calculating wind derivatives, especially divergence and tex velocity, maps of the u and v components are constructed. The procedure for analyzing wind fields and the equations for calculating divergence and vortex velocity are presented. *bject Headings:* **1. Wind derivatives calculation 2. Wind field analysis 3. Vortex velocities.** *I.L.D.*

12.9–257 551.501.42:551.571(02)

Rojecki, Ananiasz, **Tablice psychrometryczne.** [Psychrometric tables.] 2d corrected d enl. ed. *Poland. Panstwowy Instytut Hydrologidzno-Meteorologiczny, Ser. A, Instrukcje i dreczniki*, No. 41, **1959.** 32+211 p. Almost entirely tables. eqs. Introd. in Polish, glish, French and Russian. **DWB** (M7 R741ta)—A large volume containing detailed ychrometric humidity tables: dew-point, vapor pressure, relative humidity for every one-nth degree from $t = -10°C$ to $-0.1°C$ (over water), $-30°C$ to $0°C$ over ice, $0°$ to $-37°C$ er water, and $0.1°C$ to $5°C$ over ice and corrections for each system for pressure from 1090 mb wn to 510 mb, etc. *Subject Headings:* **1. Psychrometric tables 2. Polish handbooks.**—*M. R.*

12.9–258 551.501.45

Byrne, G. D., **A series of programs for computing some meteorological functions.** *Sandia rporation, Albuquerque, N. Mexico, Technical Memorandum*, 290-58(51), Aug. **1958.** 103 p. figs., numerous tables. "Contract AT-(29-1)-789." Photocopy (Negative). **DWB** M(055) S217t)—This memorandum presents a series of programs for computing various eteorological functions on the ERA 1103A (Univac Scientific). The functions computed clude seasonal mean winds, monthly mean winds, wind shears, and seasonal effect scaling nds, as well as the standard deviations for each of these. Also computed were the MAUCHLY ipticity functions, space-time correlation coefficients, seasonal time-lag correlation coeffi-nts, and monthly and seasonal correlation coefficients. The data were from 51 (mostly rth American) weather stations, each providing one reading per day at 13 pressure levels om 950 mb to 30 mb) for a 5-yr period. *Subject Heading:* **1. Meteorological parameter mputation.**—*Author's abstract.*

12.9–259 551.501.45:519.24:551.578.4

Jovičić, Slavka (*Belgrade*), **O jednom načinu odredivanja srednjeg datuma neke pojave klimatološke nizove u kojima se ta pojava nije redovno javljala.** [Method for determining e mean data for phenomena occurring irregularly in a climatological series.] *Zagreb, ugoslavia, Hidrometeorološki Zavod NR Hrvatske, Rasprave i Prikazi*, 8(4):57–60, **1959.** bles. Serbo-Croatian and French summaries p. 57–58. Also in *Yugoslavia. Hidrometeoro-ka Služba, Vesnik*, 8(1/2):44–46, Jan./June **1959.** 4 tables. French summary p. 46. **WB**—Data obtained from observations at mountain stations, 1925–1940, are used to deter-ine the mean date of the first and last snowfalls. The procedure employed to calculate the owfall series data is explained. *Subject Headings:* **1. Snowfall series 2. Statistical methods.** *Transl. from author's abstract.*

12.9–260 551.501.45:519.2

Lévy, Paul, **Un paradoxe de la théorie des ensembles aléatoires.** [A paradox of the eory of random functions.] *Académie des Sciences, Paris, Comptes Rendus*, 248(2):181–184,

Jan. 12, 1959. **DWB, DLC**—X being a random variable with values x in an interval Ω, an $y=f(x)$ a function with values in an interval Ω^*, it may happen that $y=f(x)$ is subject to continuous law; however, for any function $E^* \subset \Omega$, $Pr(Y \in E^*)$ cannot be at the same tim definitely; >0 and $<I$. Examples in which the Y values are random functions, show tha one could not avoid the study of these random elements. *Subject Heading:* **1. Random functio theory.**—*From transl. of author's abstract.*

12.9–261 551.501.5:551.5

†Lauer, Wilhelm, **Klimadiagramme Gedanken und Bemerkungen.** [Climatic diagrams some considerations and remarks.] *Erdkunde*, 14(3):232–242, Aug. **1960.** 13 figs., 25 ref English and Spanish summaries p. 232–33. **DLC**—In climatology, diagrams are importan in the elucidation of descriptive material and maps. They assist in the recognition of man causal connections and the establishment of climatic types. For investigations dealing wit large areas, temperature and precipitation diagrams are the most suitable for characterizin climate. Three different types of diagrams are usually distinguished: 1) The usual diagra (after A. HETTNER) showing the course of precipitation and temperature throughout the yea 2) Climagrams. 3) Humidity diagrams in which temperature and precipitation are expresse through an index. The two latter types of diagrams can also show rainy and dry seasons the appropriate limit of dryness is entered. GAUSSEN, 1953, and WALTER, 1955, have show that the HETTNER diagram may also be used for showing humid and dry seasons provided th P- and T-ordinates are entered in the proportion $p=2t$. This paper shows that the formul $p=2t$ is not suitable for all types of climate and is only valid for those regions for which th authors mentioned developed this quotient. For the tropics especially, and also for zone characterized by an alternation between rainy and dry seasons, it is suggested that de Ma tonne's index of dryness should be used. In temperate climates, especially those where rai occurs at all seasons, and in boreal climates, it is the temperature which characterizes th weather over the year. An ombrothermic quotient which merely emphasizes dry and humi seasons is then of little use. In any case a world atlas of climatic diagrams, as suggested b WALTER, would have to employ different indices to suit the different climates. Thus, thoug diagrams offer valuable assistance and a means of presentation for a classification of climate they hold no new key to a solution. *Subject Heading:* **1. Climatic diagrams.**—*Author summary.*

12.9–262 551.501.7:551.501.9(477.9

Artemenko, S. D. and Nikolich, I. N., **Opyt raboty Odesskoĭ aerologicheskoĭ stantsi** [Experience of the Aerological Station, Odessa.] *Meteorologiia i Gidrologiia*, Moscow, N 6:31–32, June **1960. DWB, DLC**—Organized systematic daily aerological observations in th Odessa Hydrometeorological Station are described in detail. The work of professional pe sonnel is distributed among the aerological engineer, radio engineer and two aerological tech nicians with interchangeable shifts of duty on specific occasions. Preparation of soundin balloons for flight, recording and interpretation of received signals and observation data a discussed in the text. *Subject Headings:* **1. Upper air observation techniques 2. Aerologic stations 3. Odessa, Ukrainian S.S.R.**—*N.P.S.*

12.9–263 551.501.7:551.547.5:551.509.31

§Corby, G. A. (*Met. Office, Dunstable*), **Some experiments in the objective analysis contour charts.** *Royal Meteorological Society, Quarterly Journal*, 87(371):34–42, Jan. 196 3 figs., table, 4 refs., 8 eqs. **DWB, DLC**—The quality of a series of objective analyses synoptic charts has been examined and it has been found that statistically the discrepanci from manual analyses are of the same order as the variations which arise amongst convention analyses by different individuals. A systematic fault in the computed analyses of surfa maps (i.e., an under-estimation of the depth of intense depressions over the ocean) was foun to be due to the use of geostrophic approximation and to other limitations of the interpolati system. Modifications designed to overcome this shortcoming have raised the standard of th analysis of depressions to that of the analyses as a whole. *Subject Headings:* **1. Synoptic cha analyses 2. Surface map analyses 3. Contour chart analyses.**—*Author's abstract.*

12.9–264 551.501.7:551.551.5

Reed, Richard J., [**Comments on**] **W. Schwerdtfeger and U. Radok: Hodograph analysis applied to the occurrence of clear-air turbulence and** [**Replies by**] **Edwin L. Keitz; Schwerdtfeger and Radok.** *Journal of Meteorology*, Boston, 17(4):476–478, Aug. 1960. refs., 8 eqs. **DWB, DLC**—The purpose of this note is to present arguments to the effect that (1) differential advection is probably not an important factor in the formation of clear air turbulence and that (2) decreased hydrostatic stability may just as well lead to an increase in the Richardson number as a decrease. KEITZ replies that differential advection is an important factor in the formation of local instability, and instability should be an important factor in the formation of clear air turbulence. SCHWERDTFEGER and RADOK reply that REED's claim that differential advection has no effect whatsoever on individual stability change may be disposed of simply and they suggest, in part, that the relevance of differential advection for clear air turbulence requires further confirmation by observations, by using either KEITZ's method or hodograph analysis. (For abstract on original article, *see* 11.4–190, April 1960, *Met. Abs.*) *Subject Headings:* **1. Clear air turbulence 2. Hodograph analysis.**—*E.Z.S.*

12.9–265 551.501.771:551.571.1

Bosen, Julius F. (*Office of Climatology, U. S. W. B., Wash., D. C.*), **A formula for approximation of the saturation vapor pressure over water.** *Monthly Weather Review*, Wash., D. C., (8):275–276, Aug. 1960. fig., table, 3 refs. **DWB, DLC**—The equation presented here approximates the saturation vapor pressure over water with reasonable accuracy for temperatures in the range $-60°F < t < /30°F$:

$$e_s \cong (0.0041t+0.676)^8 - 0.000019/t+16/+0.001316,$$

where e_s = the saturation vapor pressure over water in inches of mercury, and t = the temperature °F. The relative error of approximation, in terms of percentage divergence from GOFF-GRATCH computed values, is tabulated. *Subject Headings:* **1. Saturation vapor pressure 2. Saturation vapor pressure formulas.**—*E.Z.S.*

12.9–266 551.501.81:551.510.535:551.594.13

Carlson, H. N., **Experimental and theoretical studies of ionosphere echo polarization over the swept frequency range 50–1000 kc/s.** Pennsylvania. State Univ. Ionosphere Research Lab., Contract AF 19(604)-3875 Scientific Report No. 139, October 1, 1960. 41 p. 11 figs., tables, 8 refs., 26 eqs.—When electron density gradients are low enough, the echo from the $N = N_y$ level is found to change from left-handed to right-handed when the wave frequency is increased, as predicted theoretically. The $N = N_c$ echo appears near the middle of the frequency range and it is left-handed as expected. These echoes often overlap and interfere. When the overlap is slight, regular interference fringes appear as radio frequency is increased, permitting a determination of the virtual height separation that agrees with, and is much more accurate than, the virtual height difference as measured by the time elapsed between reception of the echoes. With extreme gradients, the *E*-layer echo polarization is found to change from left-handed to right-handed and back to left-handed just once with no measurable increase in group height. It is shown that a simple ionosphere model, a step function, is adequate for a qualitative explanation of these changes in sense of rotation. It was found that the polarization of *E*-layer echoes frequently varies unsystematically. Antenna site effects can be ruled out as a cause of this and an explanation is offered that requires echoes that are double because of either high gradients or horizontal inhomogeneities. *Subject Headings:* **1. Ionosphere echo polarization 2. E-layer echo polarization 3. Double echoes 4. Echo polarization.**—*Author's abstract.*

12.9–267 551.501.81:551.578.41:551.593.54

Hughes, Patrick E. (*W. B. Airport Sta., Wash., D. C.*), **An apparent observation of ice crystal haze by radar.** *Monthly Weather Review*, Wash., D. C., 88(9/12):349–352, Sept./Dec. 1960. 8 figs., ref. **DWB, DLC**—An unusual example of precipitation aloft was observed on the WSR-57 radar at Washington National Airport from 2200 EST March 4, until 0800 EST March 5, 1960. The echo appeared in all quadrants for much of the period. It formed a ring or "halo" about the center of the PPI scope, similar to the presentation associated with a layer

of altostratus clouds, sometimes detectable on the WSR-57. This return, however, was brighter, and in appearance resembled that of light snow. Weather observations, synoptic conditions and upper air soundings are explained. The echoes, at least locally, appeared to have been from frozen precipitation particles, presumably ice crystals, suspended in layers and independent of accompanying clouds. The phenomenon might be regarded as ice crystal haze. The intensity of the return was due to the hydrometeoric nature of the particles, as well as to their relatively larger size, as compared to cloud droplets. The observed phenomenon was probably a dissipated stage of the snow showers farther north, associated with the upper low system. The radar layers, then, would have represented those frozen particles which remained, lacking sufficient weight to precipitate. PPI and RHI photos are reproduced. *Subject Heading:* **1. Ice crystal haze.**—*E.Z.S.*

12.9–268 551.501.83:551.515.2/3

†Sievers, Henry Emmett, **Investigation of storm intensity by means of sferics.** May **1959.** Thesis (Ms. Sci.)—Texas Agricultural and Mechanical College. 59 p. 8 figs., 4 tables, 45 refs. **DWB** (M94.6 S573in)—Sferics have long been used for location of thunderstorms. An investigation was made of the possibility of using sferics to identify severe storms and tornadoes. This thesis discusses ways in which sferics parameters may be correlated with storm intensity. Four such parameters are discussed: intensity, flashing rate, frequency spectrum, and change in flashing rate. Investigations conducted into the frequency spectra of sferics using tuned receivers are described, as are investigations testing certain flashing rate theories. Data inadequacies limit the significance of the frequency spectra results, and other results are rather inconclusive. The investigations serve mainly to illustrate the complexity of the problem and point out possible methods of attack for the future. *Subject Heading:* **1. Sferics thunderstorm location.**—*Author's abstract.*

OBSERVATIONAL DATA (551.506)

See also: **Historic Weather Date—Hohenpeissenberg Observatory** (Lamont), 12.9–16; **Ant. Exp.—S. Pole** (Borchgrevink), 12.9–22; **Int. Antarctic Analysis Center** (Dwyer), 12.9–29; **Austr. Nat. Ant. Res. Exp.** (Law), 12.9–30; **Soviet Ant. Climate Investig.** (Burkhanov), 12.9–31; **Ant. meteorol. work on Lena exp., 1956–7** (Dzerdzeevskii), 12.9–32; **U. S. I.G.Y. Arctic program** (Reed), 12.9–35; **I.G.Y. artif. radioact. meas.** (Facy), 12.9–36; **I.G.Y. world warning bureau** (U.R.S.I.), 12.9–37; **Swedish-Finnish-Swiss N. E. land exped.** (Liljequist), 12.9–38; **Polish Spitzbergen exp.** (Niewodniczański), 12.9–39; **I.G.Y.** (Webster), 12.9–41; **Historical observations—Warsaw** (Rojecki), 12.9–54; **Forest fires—British Columbia—1958** (Turner), 12.9–82; **Eclipse effects on met. variables** (Branicki), 12.9–181; **I.G.Y. micrometeorite meas.** (Dubin), 12.9–193; **Latitudinal distr. of mag. activity—Canada** (Whitham, et al.), 12.9–199; **Visual obs. of aurora—New Zealand, Campbell Isl.** (Gadsden and Gadsden), 12.9–217; **Oxygen radiations 6300 and 5577 Å** (Barbier, Glaume), 12.9–224; **Cyclone season 1959–60** (Davy), 12.9–322; **Solar radiation obs.** (I.R.S.A.C.), 12.9–335; **Evapotrans. data** (Valken), 12.9–367; **Precip.—Tatra mtns.** (Karasiński), 12.9–385; **Climatic data—Moline, Ill.** (U. S. W. B.), 12.9–418.

12.9–269 551.506.1(493)

*Belgium. Institut Royal Météorologique, **Annuaire climatologique, 1959.** [Climatological Yearbook, 1959.] Its *Publications, Ser. A*, No. 14, **1960.** 94 p. chart, numerous tables. **DWB**—This yearbook consists of two parts. The first contains the monthly data on the principal meteorological factors of 6 synoptic stations and the pluviometric data from about fifty stations spread over the different natural regions of the country. The second part contains the daily hour-values or daily two-hour values of the principal meteorological factors for Uccle. *Subject Headings:* **1. Meteorological yearbooks 2. Uccle, Belgium 3. Belgium**—*A.V.*

12.9–270 551.506.1:551.481.1(798)

Rock, Carroll (*U. S. Army Quartermaster Res. & Engin. Center*), **Climatic observations during spring and early summer 1959, Lake Peters, Alaska.** *U. S. Air Force. Cambridge*

search Center, GRD Research Notes, No. 29, Dec. 1959. p. 95–97. **DWB**—From April 29 July 1, observations were made thrice daily. Thereafter, observations were made more quently. Data gathered from April 29 to June 30 are discussed, but only brief reference is ade to data taken June 30–Aug. 27. *Subject Headings:* **1. Meteorological data 2. Lake sters, Alaska.**—*E.Z.S.*

12.9–271 551.506.1:551.513.1(74)

§Stark, L. P. (*U. S. W. B., Wash., D. C.*), **The weather and circulation of August 1960: a month dominated by a circulation reversal.** *Monthly Weather Review*, Wash., D. C., 88(8): 286–293, Aug. 1960. 9 figs., table, 8 refs. **DWB, DLC**—A major reversal in the large scale 700 mb mean circulation over North America and adjacent oceans occurred from the first half of the last half of Aug. 1960. This intra-monthly change contributed substantially to the weather and circulation of the whole month. It is particularly notable because summer months are generally subject to considerable persistence. Consequences of the intra-monthly circulation change included a readjustment of the weather anomalies both within the month and from the preceding month. Details are given of the contrasting temperature patterns, the monthly mean weather anomalies of temperature and precipitation, the monthly mean 700 mb circulation, and the tropical storms of the month are described. Maps and charts are included. *Subject Headings:* **1. Atmospheric circulation 2. Weather anomalies 3. North America.**—*E.Z.S.*

INSTRUMENT CARRIERS (551.507)

See also: **Planetary photography from balloon-borne telescope** (de Vaucouleurs), 12.9–184; **Space research to moon and planets** (Gold), 12.9–185; **Mars probe trajectories** (Dugan), 12.9–186; **Space station lunar photography plans** (Blagonravov), 12.9–189; **I.G.Y. micrometeorite meas.** (Dubin), 12.9–193; **Ionos electron content and distr. from satellite obs.** (Garriott), 12.9–209; **Seasonal variations of electron concentration** (Klinker, et al.), 12.9–215; **C. R. meas. on geophys. rockets** (Shafer and Iarygin), 12.9–251; **Satellite C. R. obs.** (Vernov, et al.), 12.9–252, 12.9–253, 12.9–254, 12.9–255; **Electronic gust load integrator** (Tevriukov), 12.9–280; **Balloon-borne particle counter** (Lieberman), 12.9–285; **Met. significance of meas. of infra-red emission** (Houghton), 12.9–336.

12.9–272 551.507.22(261/264)

Frankcom, C. E. N., **Editorial [on Atlantic weather ships].** *Marine Observer*, London, 30(189):110–111, July 1960. **DWB, DLC**—The British weather ship "Weather Observer" completed her one hundredth patrol this April. The decision to set up the weather ship organization was made at an ICAO meeting in 1946. Originally there were thirteen stations; this number has since been reduced to nine. The scheme is financed by payments from member countries according to the number of Atlantic civil aircraft crossings. The fifth North Atlantic Ocean Station Conference in April this year voted an increase in the money to be provided to meet rising costs. *Subject Headings:* **1. Weather Ships. 2. Atlantic Ocean.**—*R.B.*

12.9–273 551.507.321.2:551.557

*Sissenwine, Norman; Mulkern, Matthew T.; and Salmela, Henry A., **Design wind profiles from Japanese relay sounding data.** *U. S. Air Force. Cambridge Research Center, Air Force Surveys in Geophysics*, No. 117, Dec. 1959. 33 p. 8 figs., 5 tables, 14 refs. **DWB, DLC**—The best balloon-measured upper winds over Japan are the Tateno relay soundings, a special series of observations especially developed to provide an accurate sounding capability for this area. From these soundings (which are corrected for the curvature of the earth), only those in which a wind speed at either 3, 6, 9, 12, or 15 km exceeds the values achieved 99 and 95% of the time have been selected. Profiles, both synthetic and typical, exhibiting general characteristics common to these high speed cases, are presented. Directional changes accompanying the wind shears are studied and are found to be small in the majority of the soundings. *Subject Headings:* **1. Upper air wind profile 2. Upper air sounding data 3. Japan. I. N. Sissenwine II. M. T. Mulkern III. H. A. Salmela.**

12.9–274 551.507.352:551.515.2

Hawkins, Harry F. (*U. S. W. B.*), **The hurricane beacon.** *Weatherwise*, Boston, 13(3):91–93, June 1960. 3 photos. **DWB**—A specially equipped aircraft will seek out the eye of a well developed hurricane at sea and drop a bomb-like balloon launcher right into the center. The launcher will release a chute to slow the rate of descent. A mylar balloon will carry a payload of batteries, transmitters, and gadgets up to a preselected floating altitude around 15,000 ft. As long as the beacon remains in the eye, the reconnaissance plane can stand off at safe flying weather and dial the location of the storm. A low frequency transmitter will permit radio direction finding from shorebased stations up to 1000 miles away. *Subject Headings:* **1. Artificial hurricane reconnaissance 2. Hurricane beacons.**—*E.Z.S.*

12.9–275 551.507.362.2

Widger, William K. (*Geophysics Research Directorate, L. G. Hanscom Field, Bedford, Mass.*), **Satellite meteorology—fancy and fact.** *Weather*, London, 16(2):47–55, Feb. 1961. 8 figs., 9 refs. **DLC** (QC851.W4)—In 1957 WEXLER published a drawing showing what he considered cloud patterns and systems would look like from satellite heights. In this paper the author reproduces a number of randomly chosen photographs taken from the Tiros I satellite and compares them with WEXLER's conception. WEXLER's depiction was somewhat in error in respect to the intertropical convergence zone, the squall line, and the size of the hurricane associated cloud system, but was essentially correct for such features as fronts and extratropical storms, cumulus clouds, clouds to the lee of mountains, stratus and high pressure areas. *Subject Headings:* **1. Satellite photographs 2. Weather systems.**—*R.B.*

METEOROLOGICAL INSTRUMENTS (551.508)

See also: **Thermotechnical measuring instruments** (Mironov and Shipetin), 12.9–11; **Radiosonde effects on meas. frequency of ducting layers** (Wagner), 12.9–108; **Direction of arrival and polarization of whistlers** (Delloue), 12.9–202, 12.9–203; **Dust recording instrument** (Crosse, et al.), 12.9–293; **Turbulence meas. by hot wire anemometers** (Gaviglio), 12.9–353; **Heavy rainfall—Dorrigo, N.S.W.** (Moss), 12.9–391.

12.9–276 551.508.53

Reid, D. G. and Sumner, C. J., **A simple wind direction recorder and an example of its field use.** *Weather*, London, 14(6):198–203, June 1959. 5 figs., 3 refs. **DWB**—The design and construction of the wind direction recorder in use for two summers are described and illustrated. It produces a clear record showing changes in wind direction. A sample record shows a sharp wind shift. Rough estimates of wind speed can be made from the breadth of the traces. *Subject Heading:* **1. Wind direction recorders.**—*E.Z.S.*

12.9–277 551.508.54

The measurement of flow velocities. *Electronic Engineering*, London, 33(397):159, March 1961. fig., photo. **DLC**—A brief description, together with a circuit diagram and photograph, is given of an instrument known as a constant temperature anemometer which has been developed in Denmark. A small length of plated tungsten wire is placed in the airstream and kept at a constant temperature by passing an electric current. The amount of electrical energy required gives an indication of the speed of flow. Velocities in the range from a few cm/s to a maximum of 150 m/s can be measured and instantaneous flow velocities up to frequencies in excess of 50 kc/s can be detected. *Subject Headings:* **1. Constant temperature anemometer 2. Anemometers.**—*R.B.*

12.9–278 551.508.54

Rider, N. E. (*Meteorological Office, Great Britain*), **On the performance of sensitive cup anemometers.** *Meteorological Magazine*, London, 89(1057):209–215, Aug. 1960. 3 figs., photo, 2 refs. **DWB, DLC**—Certain difficulties and possible sources of error associated with the use of sensitive cup anemometers (M. O. stores ref. met. 639) and more particularly with the electric contact variant of the same external configuration, are outlined. Suggestions are made for a method of exposing these instruments, especially in profile work, which will minimize

ror. A new method of anemometer construction, which overcomes at least one of the sources of error and has other worthwhile advantages, is described. *Subject Headings:* **1. Cup anemometers.**—*Author's abstract.*

12.9–279 551.501.75:551.508.57

Miller, Paul H., **Improved time-altitude method for computing winds aloft using rawinsonde data.** *U. S. Naval Ordnance Test Station, Inyokern, Calif., NOTS TP 2486;* NAVWEPS report 7076, May 19, 1960. 14 p. fig., 4 foot-refs. **DWB** (M(055) U584np)—A simplified and readily applicable technique was developed at the U. S. Naval Ordnance Test Station for rapidly obtaining more accurate winds aloft data based on rawinsonde information. The method employs either meters or feet and may be reduced as levels either above the surface or above mean sea level. *Subject Headings:* **1. Rawinsonde techniques 2. Upper air wind computation techniques.**—*Author's abstract.*

12.9–280 551.507.352:551.508.59:551.558:551.551

Tevriukov, A. A., **Elektrointegrator peregruzok na usilitele postoiannogo napriazheniia s elektromekhanicheskim preobrazovatelem.** [Electronic gust load integrator attached to a constant voltage amplifier with an electromechanical transformer.] *Moscow. Tsentral'naia Aerologicheskaia Observatoriia, Trudy,* No. 31:43–49, 1959. 3 figs., 6 refs. **DLC**—Turbulent conditions in the atmosphere are studied, using aircraft which is considered as a measuring device, evaluating atmospheric turbulence in terms of the overload of the center of gravity of the aircraft, due to vertical wind gusts. The optical recorder (K4-51) is used to indicate vertical velocities and values of the vertical overload. The method of observation is briefly outlined in the text. The electronic equipment of the integrator and mathematical formulation of the magnitude and direction of operating electric current in the amplifier in relation to changing overloads are described in detail. The construction and operation of the electromechanical transformer are described with a diagram. *Subject Headings:* **1. Airplane instrumentation 2. Gustiness measurement equipment 3. Vertical wind velocities in gusts.**—*N.P.S.*

12.9–281 551.508.79:772:551.579.5:551.578.11

†Sivadjian, Joseph, **Dix années d'hygrophotographie.** [Ten years of hygrophotography.] *L'Année Biologique,* Paris, Ser. 3, 36(5/6):199–216, May/June 1960. 2 figs., 9 plates, 52 refs. **DLC, DA**—Hygrophotography is the technique of obtaining pictures through the combined action of light and moisture on a sensitive layer. It is based on reversible color changes undergone by a compound salt of silver iodide and mercury and the emulsion obtained with this salt under the successive action of light and of moisture. This article is a discussion of progress achieved in this field during the past years. After having explained the chemical principles of the hygrophotographic technique, the author successively examines various applications among which are included the measurement of soil moisture and the determination of the characteristics of raindrops. The application principle of this technique in these instances is explained and mention is made of the results obtained. *Subject Headings:* **1. Hygrophotography 2. Soil moisture measurement techniques 3. Rain drop properties determination.**—*A.V.*

12.9–282 551.508.822

Hooper, A. H., **Recording equipment for the British radio-sonde.** *Meteorological Magazine,* London, 89(1054):147–150, May 1960. 2 figs., **DWB, DLC**—The equipment now being installed is capable of producing a permanent record of the signals received and will both improve the accuracy of upper air reports and provide fine structure information for research and special purposes. Each radiosonde ascent provides about 150 signals of both temperature and humidity. *Subject Heading:* **1. Radiosonde instruments.**—*E.Z.S.*

12.9–283 551.508.822:551.524.731

Jordan, C. L. (*Florida State Univ.*), **Apparent diurnal temperature variations from radiosonde observations.** *Journal of Meteorology,* Boston, 17(5):569–571, Oct. 1960. 2 tables, 5 refs. **DWB, DLC**—Data presented in this note suggest that in the lower latitudes the type

of inconsistencies in radiosonde data brought out by TEWELES and FINGER (1960) in their study of stratospheric data are large enough to be important even at upper tropospheric levels. These data also indicate that the earlier types of exposed thermistors were probably much more susceptible to radiation error than those used in recent years. Tables show change in mean monthly 200 mb temperature during 1951 at Clark Field, P. I. over 6 hr periods and change in mean monthly 200 mb temperature during 1951 and 1956 at Clark Field, P. I., Albrook Field, C. Z. and Wake Island over indicated 12 hr periods. Definite conclusions concerning the relative accuracy of the temperatures measured with radiosonde instruments employing different types of thermistors cannot be reached from a study of data of the type discussed since the true magnitude of the diurnal temperature variation at upper levels is unknown. Data of this type do, however, clearly indicate that observations made with different types of radiosonde instruments cannot be considered as a homogeneous sample in climatological studies. *Subject Headings:* **1. Diurnal temperature variations 2. Radiosonde observations** *E.Z.S.*

12.9–284 551.508.822

Usol'tsev, V. A., **Poluavtomaticheskiĭ registrator dlia radiozonda A-22-III.** [Semi-automatic recorder for the A-22-111 radiosonde.] *Leningrad. Nauchno-Issledovatel'skiĭ Institut Gidrometeorologicheskogo Priborostroeniia, Trudy*, No. 7:73–79, **1959.** 5 figs., ref. **DWB**—The special semiautomatic recorder of the PR-4 type for use with the A-22-III radiosonde was so devised as to permit the operator receiving the signals by ear, to record them without attention to a diagram tape in the form of curves representing variations of temperature, pressure and relative humidity. The values of the meteorological elements are transmitted by Morse code and involve 40 letters representing the numbers 0 to 9. One hundred different values can be represented for each element, each value consisting of ten numbers. The recorder is an electromechanical device and records the signals by means of a relay mechanism. Corresponding to the number of simple signals that are received there are 100 similar electromagnets. For each of these signals a point is printed on the magnetic tape of the recorder while its position is determined by the number of the functioning electromagnet. With the aid of diagrams the author describes the signalling system, the mechanism of color alternations for each meteorological element, the motor mechanism, the electromagnetic printing punch and the release mechanism. *Subject Heading:* **1. Radiosonde recorders.**—*I.L.D.*

12.9–285 551.508.91:551.507.321.2

Lieberman, A., **Development of a balloon-borne particle counter.** Armour Research Foundation (Illinois Institute of Technology), Contract AF 19(604)-5895, Report No. ARF 3157-14, Final Report, Aug. **1960.** 27 p. 4 figs., table. **DWB**—The objective of this project was the development of a laboratory prototype light scattering single particle counter which would demonstrate the feasibility of constructing flyable balloon-borne instrumentation to analyze particles 1 micron and larger at altitudes ranging from 30,000 to 100,000 ft. Design drawings for such flyable instrumentation were prepared. Investigations of air handling, optics, and electronics were carried out. It was concluded that an unsheathed, nonlaminar air stream would permit straightline particle flow in its center. A large diameter intake and flow system minimizes the effects of wall deposition. An optical design that permits a viewing volume of 50 mm^3 and a signal-to-noise ratio of 2.5:1 for 1 micron particles was used for the prototype. Electronic circuitry was used that permitted measurements of signal-to-noise ratios and pulse shape for several operating conditions. Sufficient information was obtained to permit establishing feasibility of design and the layout of transistor logic from the laboratory prototype data. Based on this information, working drawings for the optics and air handling sections have been prepared and level detectors circuitry has been breadboarded for the pulse height analyzer. *Subject Headings:* **1. Particle counters 2. Electronic circuitry.**—*Author's abstract.*

12.9–286 551.508.91

Neuwirth, R. (*Freibrug i. Br.*), **Erfahrungen mit der Staubbechermethode nach Teichert.** [Experiments with the dust pan method of Teichert.] *Meteorologische Rundschau*, Berlin

2(5):146–147, Sept./Oct. 1959. 2 figs., 4 refs. German summary p. 146. **DWB, DLC**—The collection and measurement of dust by Teichert's dust pan method is compared with the method using aluminum foil. Results of both are of the same order of magnitude. However, further tests will indicate in which geographic area each of these would be most efficient. *Subject Headings:* **1. Dust measurement techniques 2. Dust pan method 3. Dust measuring equipment.**—*E.Z.S.*

12.9–287 535.242:551.508.91

Pollak, L. W. and Metnieks, A. L., **Intrinsic calibration of the photo-electric condensation nucleus counter Model 1957 with convergent light-beam.** Dublin Institute for Advanced Studies. School of Cosmic Physics, Contract AF 61(052)-26, Technical (Scientific) Note No. 9, 1960. 62 p. 3 figs., 17 tables, 10 refs.—The intrinsic calibration of the photoelectric condensation nucleus counter Model 1957 with convergent light beam is based on a so-called '*e*, *E* curve', where *E* denotes the extinction for the concentration *Z* and *e* that for the concentration $Z/2 \cdot 18$. The *e*, *E* curve is within reasonable limits independent of the particular photoelectric counter model 1957, the alignment and type of the light-pencil whether divergent or convergent, the size of the diaphragm directly above the photocell and the speed of producing the over-pressure with filtered air. The dilution ratio, however, for which the *e*, *E* curve is valid, must be accurately known. The ratio between any two concentrations read off from the intrinsic calibration curve or calibration table based on the *e*, *E* curve is also independent of the instrumental specification and of the absolute values taken as basis for the calibration. The absolute values of the calibration curve or table, of course, depend on the factors mentioned. A convergent light beam has been used for this calibration and is strongly recommended in order to prevent 'scintillation' with very low concentrations and to ensure long-term agreement between counters of identical construction. *Subject Heading:* **1. Photoelectric condensation nuclei counters.**—*Author's abstract.*

SYNOPTIC ANALYSIS AND FORECASTING (551.509)

See also: **Weather analysis manuals** (G. B. M. O.), 12.9–15; **Local forecast studies bibliog.** (U. S. Air Wea. Svc.), 12.9–66; **Power spectra-atmos. turbulence** (Zbrozek), 12.9–71; **Extended range fire weather forecasts, Oregon** (Beers and Colson), 12.9–78; **Fire climate surveys** (Schroeder), 12.9–81; **Snow melt flood forecast—Kama River** (Lebedeva), 12.9–125; **Analysis of contour charts** (Corby), 12.9–263.

12.9–288 551.509.3:551.515:551.574.42(713)

*Thomas, M. K., **Glaze storm of December 26–28, in Southern Ontario.** *Canada. Meteorological Branch, CIR-3322,* CLI-23, April 7, 1960. 5 p. 4 tables. **DWB, DLC**—This describes the heavily damaging and severe freezing drizzle that swept through parts of Southern Ontario Dec. 12, 26–28, 1959, and again on Jan. 12–13, 1960. A general synoptic analysis is given of the high pressure areas, the extent of the warm fronts, the freezing drizzle temperatures at elevations above and under 10,000 ft, and of the occurrence of snow at various localities. Toronto and Trenton areas had freezing drizzle which exceeded the overall average annual number of freezing precipitation hrs. Over Ontario, Dufferin, Peel, York and Wellington counties, it was over an in. Wind velocity was very high in many areas, particularly at Centralia where a gust of 55 mph was reported. All the data are given in tabular form. *Subject Headings:* **1. Glaze storms 2. Synoptic conditions for freezing drizzle 3. Southern Ontario, Canada.**—*N.N.*

12.9–289 551.509.311:551.515.8(265.4)

Toyama, Y., **An analysis of gust over the Japan sea on April 14, 1957.** *Journal of Meteorological Research,* Tokyo, 11(6):543–548, June 1959. 10 figs., 4 tables, 9 refs. In Japanese. **DWB, DLC**—A cold front accompanied by a wind gust passed through the Sea of Japan on April 14, 1957, where a migratory anticyclone was spread over Ahikawa and Wajima areas. The author has studied the cause and effect through the analysis of weather on the ground and

in the upper layer, as well as the development of the cyclone, and its relative divergence and wind condition. The following conclusions are reached: 1) The front was formed with the mixture of a warm air mass migrating from the Sea of Japan and a cold air mass from the east of Siberia; 2) within the cold air the first and second fronts were formed due to the descending of strong cold air from the middle layer down to the lower layer in the troposphere; 3) the climate in spring and autumn brings a sudden fluctuation along the Sea of Japan, due to the track of migratory anticyclones. *Subject Headings:* **1. Synoptic conditions for fronts 2. Cold front structure 3. Gust structure 4. Sea of Japan.**—*K.C.*

12.9–290 551.509.322:551.552(213):681.14:621.38

Jordan, Charles L. (*U. S. W. B., Wash., D. C.*), **Applications of numerical weather prediction techniques in the tropics.** (In: Caribbean Hurricane Seminar, Ciudad Trujillo, Feb. 1956, **Final Report of the Seminar,** pub. **1956.** p. 192–204. 9 figs., 4 refs.) **DWB**—Use of high electronic computers for the prediction of atmospheric flow patterns should be extended into the tropics. The results of some numerical forecasts which have been extended into tropical areas are presented. Such computations may help in preparing two or three day forecasts of the general track of hurricanes, but several uncertainties and difficulties must first be removed. Vast areas in the Atlantic are without aerological data, imposing severe restrictions on numerical prediction in the tropics. An increased aerological network in the Caribbean scheduled for 1956 should provide more useful data for numerical predictions. *Subject Headings:* **1. Numerical forecasting techniques 2. Horizontal wind components 3. Electronic computer applications 4. Tropical regions.**—*E.Z.S.*

12.9–291 551.509.5

U. S. Weather Bureau, **Practice forecast program bulletin,** No. **1–4, 1959.** About 6 p. each. **DWB** (MO9.5 U587pb)—Each issue includes general comments, a table of average score of official forecasters, average scores and ranks of all the participants and a key to presentation of data. Shortcomings, with recommendations to correct them, are pointed out. *Subject Heading:* **1. Forecasters manuals.**—*O.T.*

WEATHER CONTROL (551.509.6)

See also: **Reduction of evap. losses** (Water Eng.), **12.9–363.**

12.9–292 551.509.612:634.8:631.548

Peyer, E., **Die Erfahrungen mit der Frostschutzberegnung in der Schweiz.** [Frost protection by sprinkling method: experiments carried out in Switzerland, [Pt. 1].] *Schweizerische Zeitschrift für Obst- und Weinbau,* Wädenswill, 68(25):572–575, Dec. 12, **1959**; Pt. 2; *Ibid.,* 68(26):623–625, Dec. 26, **1959. DA**—Abstract of a lecture delivered by the author, describing experiments in 1959 in the field of frost protection of fruit and vegetables by a sprinkling system. To put into practice, with good results, the theories of frost protection, intensive research has to be made. Relationship between plant development and the factors of protection under well known meteorological conditions (humidity of the air, influence of winds) is not well established. In some regions of Switzerland, frost is observed at a moment when the stage of development of trees and vineyards is very difficult to protect. At some places it was stated that the increase of the amount of water has not increased the protection of vineyards at the moment of bud formation. The author is convinced, that up to now there is no protection method giving a complete and positive result. *Subject Headings:* **1. Frost protection of vineyards 2. Frost protection methods 3. Sprinkling methods 4. Switzerland.**—*A.V.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

ATMOSPHERIC COMPOSITION (551.510.4)

See also: **CO_2 exchange—ocean-atmosphere** (Bolin), 12.9–111; **CO_2 in atmos.—Pacific and Indian Ocean and Black Sea** (Bruevich and Liutsarev), 12.9–112; **Fogs and smokes—Orly airport** (Duvergé), 12.9–372.

12.9–293 551.508.91:551.510.42

Crosse, P. A. E.; Lucas, D. H. and Snowsill, W. L. (*Central Electricity Research Lab., Leatherhead, Surrey*), **Instrument for recording the dust nuisance emitted by chimneys.** *Journal of Scientific Instruments*, London, 38(1):12–17, Jan. **1961.** 6 figs., ref. **DLC**—A new type of instrument has been designed to measure and record the likelihood of dust emitted from a chimney causing nuisance at ground level. The instrument measures the difference between the optical obscuration produced by a clean glass surface and that produced by the same glass surface when dust collected from a flue duct has settled on it. The method of collection is based on the assumption that vertical surfaces are more important in pollution than horizontal surfaces, and that coarse particles are more likely to cause nuisance than fine particles. Care has been taken in the design to eliminate errors normally associated with optical instruments of this nature, for example those caused by a dirty optical system, ageing photocells and lamps, and mains voltage and temperature fluctuations. The instrument has a novel recording method which enables it to operate over an unusually large range of signal levels. It will facilitate the control of dust emission from industrial chimneys. *Subject Heading:* **1. Dust measurement instruments.**—*Authors' abstract.*

12.9–294 551.510.42:546.22

Giovanardi, A.; Grosso, E. and De Fraja Frangipane, E. (*all, Inst. of Hygiene, Univ. of Milan; Inst. of Sanitary Engin. and Polytechnics, Milan*), **Researches on the atmospheric pollution of the city of Milan.** *International Clean Air Conference, London, Oct. 20–23, 1959, Proceedings*, pub. **1960.** p. 133–134. 4 figs. **DLC**—A program of air pollution measurement has been carried out in Milan over the last three yrs, measuring deposited matter, suspended matter, and sulphur dioxide (using the lead peroxide method). Twelve permanent stations have been used, plus extemporaneous measurements at other sites in the streets. It is concluded that badly run domestic heating systems are a greater cause of pollution during the winter than either vehicles or industry. *Subject Headings:* **1. Atmospheric pollution 2. Sulfur dioxide in the atmosphere 3. Milan, Italy.**—*Authors' abstract.*

12.9–295 551.510.42

Halliday, E. C. (*Nat. Phys. Res. Lab., South Africa*), **Research on air pollution in South Africa.** *International Clean Air Conference, London, Oct. 20–23, 1959, Proceedings*, pub. **1960.** p. 137–138. table, 5 refs. **DLC**—Air pollution in South Africa has grown rapidly since 1930. Preliminary research has been carried out, using British pattern instruments. Results show that pollution levels in large towns in the Union are comparable with pollution in English towns. As a result of increased interest, wider research projects should be possible. *Subject Headings:* **1. Atmospheric pollution 2. Union of South Africa.**—*Author's abstract.*

12.9–296 551.510.42:614

†Levine, B. S., **U.S.S.R. literature on air pollution and related occupational diseases.** Wash., D. C., Office of Technical Services, **1960.** 2 vol. (Vol. 1, 210 p. Vol. 2, 260 p.) figs., tables, refs., eqs. Transl. into English of articles in Russian (with bibliog. refs. to original source of each article). Price: Vol. 1, $3.50. Vol. 2, $4.00. **DWB** (M10.42 L665us)—Both volumes contain studies of atmospheric pollutants which are economically wasteful, and are hazards to the health of the community. At least 30 air pollutants have been studied and their maximum allowable concentrations determined. The pollutants studied were: acrolein, amyl acetate, arsenic and its inorganic compounds, benzene, butyl acetate, carbon disulfide, carbon monoxide, chlorine, chloroprene, dichlorethane, dust, ethyl acetate, fluorine and its compounds, lead sulfide, manganese and its compounds, mercury, methanol, methyl acetate, nitrogen

oxides, phenol, phosphorus anhydride, soot, sulfuric acid, sulfur dioxide, vinyl acetate. *Subject Headings:* **1. Atmospheric pollutants 2. Atmospheric pollution and health.**—*E.Z.S.*

12.9–297 551.510.42:551.524.4

Meade, P. J. (*Met. Off., Great Britain*), **Inversions and air pollution.** *International Clean Air Conference, London, Oct. 20–23, 1959, Proceedings*, pub. **1960.** p. 207–208. 3 figs. **DLC**—The effects of inversion layers in the creation of high concentrations of pollution are often exaggerated. Their effects depend on the thickness, temperature gradient, and position of the layers, as well as the thermal properties of the surrounding air. Additional complications are introduced by the height of any chimneys and the buoyancy and efflux velocity of the effluent. A number of examples are given, and it is concluded that high chimneys with buoyant effluents are advantageous, although occasional inversions would still defeat this advantage. *Subject Headings:* **1. Inversion layers—atmospheric pollution relationships 2. Atmospheric pollution.**—*From author's abstract.*

12.9–298 551.110.42

Petrilli, Fernando Luigi (*Hygiene Inst., Univ. of Genoa*), **Air pollution in the city of Genoa (Italy).** *International Clean Air Conference, London, Oct. 20–23, 1959, Proceedings*, pub. **1960.** p. 172–174. 6 tables. **DLC**—Air pollution in the city of Genoa has been studied since Nov. 1954 by the Institute of Hygiene of Genoa University of which the author is the Director. The apparatus and equipment used are as advised by the British D.S.I.R. The paper describes the geographical and meteorological characteristics of the city and also describes the various air pollution sources. The researches have shown that sulphur dioxide in the residential districts is negligible and although higher in the industrial areas is not yet comparable to those in other foreign industrial towns. Pollution by iron dust is also low in the residential districts but peaks have been reached in the industrial areas comparable to foreign towns with ironworks and engineering works. Suspended dust remains within modest limits. Carbon monoxide does not reach high concentrations except in vehicular tunnels. The city is fortunate in that the meteorological and topographic conditions create a condition favorable for the dispersion of polluting substances. The paper is accompanied by a diagram and a number of tables. *Subject Headings:* **1. Atmospheric pollution 2. Atmospheric pollutants 3. Genoa, Italy.**—*Author's abstract.*

12.9–299 551.510.42:551.588.2

Neuwirth, R. (*Freiburg i. Br.*), **Unterschiede in der Staubbelastung zwischen Ebene und Höhenlage.** [Differences in the dust content in a valley and at an elevation.] *Meteorologische Rundschau*, Berlin, 12(5):144–146, Sept./Oct. **1959.** 2 figs., 3 refs. German summary p. 144. **DLC, DWB**—The dust content of the air in Freiburg (252m) and Menzenschwand (860m) was measured with the help of an avigraph. At Freiburg the maximum is reached during the periods of least wind whereas at Menzenschwand the maximum is reached during increasing winds and inversions. The dust concentration on the plain (Freiburg) and its vertical decrease are related to the temperature gradient. *Subject Headings:* **1. Dust measurements 2. Freiburg, Germany 3. Menzenschwand, Germany.**—*E.Z.S.*

12.9–300 551.510.42:551.574.11:551.594.25

*†O'Connor, T. C.; Sharkey, W. P. and Flanagan, V. P. (*all, Univ. College, Galway*), **Observations on the Aitken nuclei in Atlantic air.** *Royal Meteorological Society, Quarterly Journal* 87(371):105–108, Jan. **1961.** 6 tables, 13 refs. **DWB, DLC**—The concentration, size and distribution of charges on Aitken nuclei in air from the Atlantic Ocean were measured at a station on the western coast of Ireland where man-made pollution was most unlikely. The results are examined in relation to the meteorological elements and human activities. Some sources of the nuclei observed in maritime air are discussed. *Subject Headings:* **1. Aitken nuclei 2. Atmospheric pollution measurements 3. Electrical charges on aerosols 4. Atlantic Ocean 5. Western coast of Ireland.**—*Authors' abstract.*

12.9–301 551.510.42

*U. S. Weather Bureau, **Meteorology and community air pollution. Summary report for 1959 and Quarterly Progress Report, April-June 1959.** Wash., D. C., Sept. **1959.** 66 p

7 figs., eqs. Photostat of typescript. **DWB** (M10.42 U587sum)—As interest and knowledge in air pollution broadens, research in this field can be expected to encompass an increasing number of scientific techniques and disciplines. The Weather Bureau, in its cooperation in the program on Community Air Pollution with the Public Health Service has shown the necessity for this tendency in its various data collection and analysis techniques and experimental and theoretical methods for the study of the parameters of air pollution. In addition to theoretical and applied atmospheric research, this annual summary report contains discussions of the technical aid furnished to a number of regional organizations concerned with problems of local air pollution. *Subject Headings:* **1. Atmospheric pollution studies 2. United States.**—*Author's preface.*

ATMOSPHERIC STRUCTURE (551.510.5)

See: **Symposium on ionized gases in magnetic fields** (Japan Science Council, Ion. Res. Comm.), 12.9–2; **Inversion over E. N. Pacific** (Neiburger, Johnson, et al.), 12.9–12; **Turbulent Heat exchg: Ice-atmosphere** (Doronin); 12.9–25; **Oxford atmos. ozone and radiation symp.** (W.M.O. Bull), 12.9–48; **Oxford atmos. ozone symposium—1959** (I.U.G.G.), 12.9–49; **Sun-troposphere conf.—Leningrad—1960** (Spiridonova), 12.9–51 (Kolobkov), 12.9–52; **Transmission loss in tropos. forward scatter propagation** (Norton) 12.9–109; **Geomag., aurora!, cosmic ray and solar activity** (Mariani and Molina), 12.9–177; **Meteors and night sky glow** (Mirtov), 12.9–195; **Proton gyration in outer atmos.** (Ondoh, Hashizume), 12.9–204; **Natural atmos. radio phenomena-geomag. field relationships** (Rybner, Ungstrup), 12.9–205; **Spread-F and latitude variation of whistlers** (Singleton), 12.9–206; **HF backscatter from *F* region** (Bates), 12.9–208; **Ionos. electron content and distr. from satellite obs.** (Garriott), 12.9–209; **Current-system of geomag. variations** (Fukushima, Maeda), 12.9–210; **Corpuscular heating of outer atmos.** (Krasovskii), 12.9–211; **True height of ioniz. in high latitudes** (Lepechinsky, Taieb), 12.9–212; **Belt of equatorial spread-F** (Lyon, Skinner), 12.9–213; **Horizontal drift in ions** (Delhi Mitra et al.), 12.9–214; **Seasonal variations of electron concentration** (Klinker et al.), 12.9–215; **Eclipse effects of F layer** (Setty), 12.9–216; **Auroral coruscations** (Campbell, Rees), 12.9–219; **Red line of the night sky at equator** (Delsemme and Delsemme), 12.9–225; **Oxygen red line in airglow and F2 region** (Huruhata et al.), 12.9–226; **Ionosphere echo polarization** (Carlson), 12.9–266; **Vertical currents** (Dushkin, Lomonosov), 12.9–302; **Hypothesis of quasi-stationary layer** (Karol'), 12.9–303; **Link between mesosphere and troposphere** (Palmer), 12.9–305; **Cumulonimbus top in stratosphere** (Menmuir), 12.9–378.

RADIO REFRACTIVE INDEX (551.510.62)

See: **Frontal perturbation of tropos. scatter path** (Hay, Poaps), 12.9–103; **Radar-echo enhancement** (Scheutz), 12.9–104; **Radar studies of met. "angel" echoes** (Atlas), 12.9–106; **Radiosonde effects of meas. freq. of ducting layers** (Wagner), 12.9–108; **Transmission loss in tropos. forward scatter propagation** (Norton), 12.9–109; **Natural atmos. radio phenomena-geomag. field relationships** (Rybner, Ungstrup), 12.9–205; **HF backscatter from *F* region** (Bates), 12.9–208.

ATMOSPHERIC RADIOACTIVITY (551.510.7)

See: **I.G.Y. artif. radioact. meas.** (Facy), 12.9–36; **Radioactivity,** 12.9–94 to 12.9–100; **Max. concen. radioactive material in sea water** (Hiyama), 12.9–113.

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE (551.511)

See also: **Turbulent heat exchange ice-atmosphere** (Doronin), 12.9–25; **Open water effects on Arctic heat balance** (Laĭkhtman, Kliuchnikova), 12.9–27; **Convection above fires** (Murgay, Emmons), 12.9–80; **Thermal history of Earth** (MacDonald), 12.9–150; **Eddy diffusivity** (Ogura), 12.9–313; **Motion of a cyclone** (Adem), 12.9–317; **Vertical vortices** (Lacaze), 12.9–330; **Temperature field in turbulent flow** (Iaglom), 12.9–340; **Influence of condensation heat on pressure changes** (Bogdanova), 12.9–350; **Fogs and smokes, Orly airport** (Duvergé), 12.9–372.

12.9–302 551.511.33:551.558:551.510.52

Dushkin, P. K. and Lomonosov, E. G., **O vertikal'nykh tokakh v troposfere.** [Vertical currents in the troposphere.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:3–10, Jan. 1960.

2 figs., table, 6 refs., 3 eqs. **DWB, DLC**—The vertical velocity of air masses can be computed only by integrating the equations of thermodynamics. If the system of equations is to be used in a quasigeostrophic, static and adiabatic approximation, the vertical velocity $\tau = \frac{dp}{dt}$, in the standard system of coordinates x, y, p, t, and its analog w, in the standard system x, y, z, t, must appear as a function of the field of heights of isobaric surfaces. For diagnostic and prognostic calculations of $\tau(\omega)$ only the field z need be known. In computing τ a three level model of forecast charts of baric topography for the isobaric surfaces of 850, 500, and 300 mb was used. In calculating vertical currents the equation for heat advection with the above approximations was used, namely:

$$\tau(\zeta) = -a\zeta^2 \frac{g}{l}\left(z, \frac{\partial z}{\partial \zeta}\right) - a\zeta^2 \frac{\partial q}{\partial t}$$

where $q = \frac{\partial z}{\partial t}$ = height tendency of an isobaric surface; $\zeta = \frac{p}{p_0}$; g = acceleration of gravity; l = Coriolis parameter; $a = \frac{gp_0}{m^2 l^2}$; $m^2 = \frac{R^2\bar{T}}{g^2}(\gamma_a - \gamma) \approx 750$ km^2; R = gas constant of dry air; $\bar{T}$ = mean temperature of the troposphere; γ_a = dry adiabatic gradient; γ = mean temperature gradient stratification in the troposphere; $(a, b) = \frac{\partial a \partial b}{\partial x \partial y} - \frac{\partial a \partial b}{\partial y \partial x}$. Working formulas for calculating vertical currents at any points on levels I–III are shown to be written in the form

$$\tau_{I,II} = -a_{I,II}'(z_2, z_1) - a_{I,II}''(q_1 - q_2) - \sum_{k=1}^{1} \Delta_k z a_{I,II\varepsilon k}'''$$

$$\tau = 0, III = -a_{III}'(z_3, z_2) - a_{III}'''(q_2 - q_3) - \sum_{k=1}^{4} \Delta_k z a_{III;k}'''$$

where 1, 2, 3 indices of the levels of 850, 500 and 300 mb, respectively; $\Delta_k z$ averaged along the ring "k" value of vortex velocity at the 850 mb surface in finite difference form; (z_{i+1}, z_i) finite differences of the ratio of Jacobians ia' and $a'' > 0$, $a_k''' > 0$ = weighted multipliers of the rings. These formulas can be either prognostic or diagnostic, depending upon which field of z is used to compute $q_1\left(z, \frac{\partial z}{\partial \zeta}\right)$, Dz. The values of vertical currents obtained with computing machines for a regular grid of points covering western Europe and the European U.S.S.R. for an actual isobaric surface field are analyzed. *Subject Headings:* **1. Thermodynamic equations 2. Vertical currents in the troposphere 3. Western Europe 4. European U.S.S.R.**—*I.L.D.*

12.9–303 551.111:551.551.8:551.510.522

Karol', I. L., **O gipoteze kvazistatsionarnogo prizemnogo sloia v teorii turbulentnoĭ diffuzii tiazhelogo aerozolia v pogranichom sloe atmosfery.** [The hypothesis of a quasi-stationary layer near the earth's surface in the theory of turbulent diffusion of heavy aerosols in the boundary layer of the atmosphere.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizicheskaia*, No. 5:758–761, May **1950.** 7 refs., eqs. **DWB, DLC.** Transl. in its *Bulletin of the Academy of Sciences, USSR, Geophysics Series.* **DLC**—The author investigates the possibility of applying the hypothesis of a quasi-stationary layer near the ground layer to the problem of turbulent diffusion of heavy aerosol and the relationship of the approximate solution thus obtained to the solution found within the framework of the semi-empirical theory of diffusion obtained previously (*Izv., AN SSR, Ser. Geofiz.* No. 7, 1959). It is shown that the simplifying assumptions concerning a quasi-stationary regime in the layer near the ground are valid only in the problem of turbulent diffusion of "weightless" mixtures (aerosol). The simplification of the solution of the problem regarding turbulent diffusion of a heavy aerosol ($2 > 0$) in the atmospheric layer near the ground can be accomplished by replacing the coefficient $K(\zeta)$ in the equation

$$\frac{\partial q}{\partial \tau} - \nu \frac{\partial q}{\partial \zeta} = \frac{\partial}{\partial \zeta} K(\zeta) \frac{\partial q}{\partial \zeta}; K(\zeta) = \begin{cases} \zeta; \zeta \leq 1 \\ 1; \zeta > 1 \end{cases}$$

by unity and the limiting conditions $q \to 0, \zeta \to +\infty$; $\left[\frac{K(\zeta)\partial q}{\partial \zeta - \theta q}\right]_{\zeta-\zeta_0} = 0$, $\theta = \beta - \nu$ at the level $\zeta = \zeta_0$ by the conditions $[\zeta \partial q/\partial \zeta + \nu q]_{\zeta-\zeta_0} = Bq(\tau, \zeta_0)$ where

$$\frac{1}{\beta} = \begin{cases} \frac{1}{\nu} + \left(\frac{1}{\beta} - \frac{1}{\nu}\right)(\zeta_0{}^{\nu} - \nu\zeta_0)(1-\nu)^{-1} & \nu \neq 0; 1 \\ 1 + \left(\frac{1}{\beta} - 1\right)\zeta_0(1 - \ln \zeta_0) & \nu = 1 \\ \frac{1}{\beta} - \ln \zeta_0 + \zeta_0 - 1 & \nu = 0. \end{cases}$$

(*Subject Headings:* **1. Turbulent diffusion theories 2. Aerosols 3. Turbulent diffusion of aerosols 4. Quasi-stationary layer near ground.**—*I.L.D.*

12.9–304 551.511:551.551.2

Monin, A. S. and Obukhov, A. M., **Fundamentale Gesetzmässigkeiten der turbulenten Vermischung in der bodennahen Schicht der Atmosphäre.** [Fundamental laws of turbulent mixing in the atmospheric ground layer.] (In: Limberg, Helmut, (transl.), **Sammelband zur statistischen Theorie der Turbulenz.** Berlin, Akademie Verlag, **1958.** p. 199–226. 4 figs., 2 tables, 20 refs., 68 eqs. German summary p. 199.) **DLC** (QA911.L47)—The article contains an investigation of the mixing processes in the turbulent atmosphere which was performed on the basis of a systematical application of analogical considerations. Empirical data on the distribution of wind-velocity on different conditions of temp. stratification are generalized, and a method was developed for computation of the characteristical exchange magnitudes, on the basis of wind velocity and temp. gradient measurements. *Subject Heading:* **1. Turbulent mixing in the atmosphere.**—*Transl. of authors' abstract.*

12.9–305 551.511:551.510.52/3

Palmer, C. E. (*Inst. of Geophysics, Univ. of Calif.*), **Possible linkages between the mesosphere and troposphere.** *Colorado. Univ. High Altitude Obs. for Solar-Terrestrial Research, Technical Report No. 1,* corrected and reissued May **1957.** 1 table. p. 142–145. **DWB** (M13.1C719t)—Discussion of physical processes by which material or energy or both can pass between the mesosphere and the troposphere. Two kinds of evidence are cited for this linkage. One is related to the exchange of material between troposphere and mesosphere and the ratios of the principal atmospheric constituents that seem to be constantly below 100 km; the second deals with energy exchange. This evidence implies energy transformation, probably in the direction of troposphere to stratosphere. Table 1 shows the results of observations and linkages not involving transport of matter which are subdivided into radiative and nonradiative, and that involve transport of matter from one region to the other, including matter unchanged and matter transformed. *Subject Heading:* **1. Mesophere-troposphere relationships.**—*K.C.*

12.9–306 551.511:533.7

Saltzman, Barry and Fleisher, Aaron (*both, M. I. T.*), **Spectrum of kinetic energy due to large-scale horizontal Reynolds stresses.** *Tellus,* Stockholm, 12(1):110–111, Feb. **1960.** fig., table, 4 refs., eq. **DLC**—Estimates have been made of the integral, which measures the rate of transfer of kinetic energy between the mean zonal flow, and the harmonic components of the eddy flow. Only the action of the horizontal Reynold's stresses on the zonal current is considered. Estimates were made for each day of 1951 using geostrophic winds at 500 mb and were based on a fifteen wave-number. Fourier resolution along every five degrees of latitude from 15 deg N to 80 deg N of contour heights spaced every ten degrees of longitude. The net transfer is directed from the eddies to the zonal flow. If we take this 500 mb estimate to be representative of the entire depth of the atmosphere then the annual average is 3.8×10^{20} ergs sec^{-1}, the winter average is 5.8×10^{20} ergs sec^{-1} and the summer average is 1.8×10^{20} ergs sec^{-1}, which are smaller but still of the same order as obtained by V. P. Starr (1959) for the same year using observed winds. *Subject Headings:* **1. Kinetic energy spectrum 2. Reynolds stress.**—*E.Z.S.*

12.9–307 551.511:551.551

Utina, Z. M., **Uchet razlichiia koeffitsienta turbulentnosti dlia temperatury i vlazhnosti v zadache o sovmerstnoĭ transformatsii.** [Calculating the difference of turbulence coefficients for temperature and for humidity in the problem of simultaneous transformation.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 69:41–44, **1957.** 3 refs., eqs. **DLC**—The turbulence coefficient is considered as the important meteorological characteristic and its average value for hour, day or month, is used in the meteorological computations. Integration process for averaging is developed from the differential equation for the molecular diffusion and equation for continuity. The turbulence coefficient varies from station to station due to changes in its average value with time. Numerical data of the Pakhta-Aral expedition are used for the computation and evaluation of the turbulence coefficient variations with temperature and humidity at their simultaneous transformation under effect of the irrigation. Differences in temperatures and humidities in the oasis and non-irrigated areas are computed by the given formulas. The results obtained under different conditions are analyzed. *Subject Heading:* **1. Turbulence coefficient calculations.**—*N.P.S.*

12.9–308 551.511.13

Wurtele, M. G. (*Univ. of Calif., Los Angeles*), **Lagrangian dynamics and the parcel method in atmospheric models.** *Journal of Meteorology*, Boston, 17(6):661–669, Dec. **1960.** 8 refs., 11 eqs. **DWB, DLC**—The Lagrangian "parcel method" of stability analysis is systematically presented and rendered rigorous in its application to nondivergent flow on a plane with constant Coriolis parameter. The method is applied in detail to two familiar models. (1) Zonal geostrophic current with linear horizontal shear. Here the parcel method is valid only for uniform initial disturbance ("infinite wavelength"), in which case the usual stability criterion applies, $-\zeta_g < f$. Another particular solution has been given by Lord Kelvin. (2) Anticyclonic vortex with concentric circular contours. Here, the parcel-method stability criterion is $-\zeta_g < f/2$ (as suggested by the balance equation) and is valid for any initial disturbance with balanced velocity field. So far, no nonsymmetric solution to the balance equation for this pressure field has been discovered. *Subject Headings:* **1. Lagrangian dynamics 2. Stability analysis 3. Atmospheric models.**—*Author's abstract.*

12.9–309 551.511.32

Platzman, George W. (*Univ. of Chicago*), **The spectral form of the vorticity equation.** *Journal of Meteorology*, Boston, 17(6):635–645, Dec. **1960.** 17 refs., 9 eqs. **DWB, DLC**—The nonlinear aspects of the vorticity equation for two-dimensional planetary circulations of the earth's atmosphere may be studied by expansion of the solution in spherical surface harmonics. Some of the main mathematical problems are discussed here that arise in an examination of the "spectral" form of the vorticity equation which results from such an expansion. The truncation of the spectral equations is discussed, and a proof is given of the invariance of mean square velocity and vorticity for truncated spectra. Some comments are made on low-order systems, which are to be followed by a detailed investigation of three-component systems in the second part of this study. (For abstract on this article from another source, *see* 11C–160, March 1960, *Met. Abs.*) *Subject Heading:* **1. Vorticity equations.**—*Author's abstract.*

12.9–310 551.558:551.511.32

Warren, F. W. G. (*Sheffield Univ.*), **The generation of wave energy at a fluid interface by the passage of a vertically moving slender body.** *Royal Meteorological Society, Quarterly Journal*, 87(371):43–54, Jan. **1961.** 4 figs., 4 refs., 26 eqs. **DWB, DLC**—In this paper an estimate is made of the energy absorbed by wave motion at the interface of two superposed fluids when a body passes from one fluid to the other. The fluids are supposed perfect, incompressible, and bounded only by the interface, and axi-symmetric and symmetrical two-dimensional cases are considered. The body is supposed to move vertically and approach the interface from a great distance, and after crossing the interface to recede to a great distance, the speed being kept steady throughout. It is assumed that there were no waves originally present at the interface and that no splashing occurs during the crossing. The linear approximation to irrotational waves is used at the interface, and the slender body approximation is used at the boundary of the body. Transform methods are used to solve the Laplace equation

the velocity potential. Expressions are found for the waves set up as the body crosses the surface, and the energy used to generate the waves is found from a calculation of the work done against the wave resistance. The wave energy may be regarded as the sum of the wave energies for two cases: one in which the density difference between the two fluids is small, and the other, in which the density of the upper fluid is zero. For the special cases of a spheroid and a spindle-shaped body, curves are shown of the wave energy against a dimensionless form of the inverse speed. Criteria are given for when maximum wave energy is developed for a spheroid, and an estimate of this energy is made. This is done in Section 6. *Subject Headings:* **1. Wave energy generation 2. Hydrodynamics 3. Vertical motion.**—*Author's abstract.*

12.9–311 532.517.4:533.1 551.511.6:551.551

Iaglom, A. M., **Homogene und isotrope Turbulenz in einer zähen kompressiblen Flüssigkeit.** [Homogeneous and isotropic turbulence in a compressible viscous fluid.] (In: Limberg, Helmut, (transl.), **Sammelband zur statistischen Theorie der Turbulenz.** Berlin, Akademie Verlag, **1958.** p. 43–70. 18 refs., 48 eqs. German summary p. 43). **DLC** (QA911.L47)—The homogeneous and isotropic turbulence in a compressible viscous fluid differing from zero viscosity and thermal conductivity is analyzed. Therewith results of the spectral theory of homogeneous accidental fields are used, and the spectral densities corresponding to the correlation functions (i.e. with the correlation momenta of second order) are considered, as basic quantities of turbulent circulation. Simultaneously a spectral interpretation of the chief results of the uncompressible case is presented. *Subject Headings:* **1. Isotropic turbulence 2. Turbulence theory.**—*Transl. of German summary; O.T.*

12.9–312 533.17 551.511.6:551.551

†Obukhov, A. M., **Statistische Beschreibung stetiger Felder.** [Statistical description of constant fields.] (In: Limberg, Helmut, (transl.), **Sammelband zur statistischen Theorie der Turbulenz.** Berlin, Akademie Verlag, **1958.** p. 1–42. 3 figs., 28 refs., 106 eqs. German summary p. 1.) **DLC** (QA911.L47)—A systematic presentation of the important questions in the theory of the above. The prerequisites to the theoretical treatment of turbulence is given. Based on results of the Soviet theory of accidental functions a systematical presentation of accidental, i.e. scalar and vectorial fields is given. The probable distribution of an accidental function; processes and fields with normal distribution rule; analysis of an accidental function to non-correlating components; statistically homogeneous and isotrope fields; potential and solenoidal fields; the structural function of a field; the rule of graph numbers in relation to discontinuous processes are derived by equations. The theory is also suitable for manifold applications of statistical research in geophysics. *Subject Heading:* **1. Statistical theory of turbulence.**—*O.T.*

12.9–313 551.511.13:551.551:551.524 551.511.6

Ogura, Yoshimitsu (*M. I. T. Mass.*), **The dependence of eddy diffusivity on the fluid Prandtl number,** (extended summary only). *Advances in Geophysics*, N. Y., Vol. 6, pub. 1959. pp. 175–177. 3 refs., 9 eqs. **DWB, DLC**—This is a condensation of "Temperature Fluctuations in an Isotropic Turbulent Flow" published in the *Journal of Meteorology* (*see* 10.7–241, July 1959, *Met. Abs.*). Using the equation of HEISENBERG, showing that the rate of transfer of energy through wave number k is represented by $\epsilon_k = 2(\nu+\nu_k)\int_0^k k^2 F(k)dk$ and Corrsin's suggestion that the rate of transfer of temperature fluctuation "energy" through the wave number k may be represented by $\theta\epsilon_k = 2(\gamma+\gamma_k)\int_0^k k^2 G(k)dR$ the author calculates the ratio of Taylor's microscale to the thermal microscale. The result $\nu_k/\gamma_k = \nu/\gamma = \sigma$ is obtained; in other words the ratio of eddy viscosity to eddy conductivity for phenomena of the same scale should be proportional to the fluid Prandtl number. *Subject Headings:* **1. Fluid Prandtl number 2. Eddy diffusion 3. Diffusion in the atmosphere.**—*I.L.D.*

12.9–314 551.511.6:551.551 532.517.4:536.2

Panofsky, H. A. (*Pennsylvania State Univ.*), **An alternative derivation of the diabatic wind profile.** *Royal Meteorological Society, Quarterly Journal*, 87(371):109–110, Jan. 1961. 5 refs., 7 eqs. **DWB, DLC**—The similarity theory has been successful in suggesting the form of the wind profile for forced and fully-free convection. From these limiting profiles, ELLISON

(1957) has designed an interpolation formula which fits the observed profiles over the whole range from forced to free convection (PANOFSKY, BLACKADAR and MCVEHIL, 1960). This theory makes it further possible to infer the heat flux from the wind profile. However, in stable air, ELLISON's formulation seems to be less successful. Therefore, Ellison's wind profile is re-derived under the assumption that in neutral and unstable air the distance from the ground determines the eddy structure. *Subject Headings:* **1. Wind profile form 2. Diabatic wind profile 3. Ellison's interpolation formula.**—*Adopted from Author's introduction and abstract.*

12.9–315 551.511.6:551.551.8

†Smith, F. B. and Hay, J. S., **The expansion of clusters of particles in the atmosphere.** *Royal Meteorological Society, Quartely Journal*, 87(371):82–101, Jan. **1961.** 9 figs., 2 tables, 17 refs., 34 eqs. **DWB, DLC**—In this paper, the problem of the spatial expansion of a cluster of particles under the action of turbulence is investigated. The basic difficulty, that this form of diffusion depends on the Lagrangian properties of the turbulent field, is met by the assumption that the Lagrangian and Eulerian time-correlograms are functionally similar. In consequence, it is possible to solve the equation governing the cluster's expansion to give prediction laws expressed only in terms of easily measured parameters of the turbulence. The application of the full solution is lengthy but a simple working approximation follows from the fact that over an important part of the expansion at which the size of the cluster is of the same order of magnitude as the Eulerian length-scale, the rate of expansion is approximately constant and is proportional to the square of the intensity of turbulence whilst independent of the length scale itself. Experiments to test these formulae have been carried out on the diffusion of clusters of Lycopodium spores over a few hundred metres downwind travel near the ground and the diffusion of long crosswind clouds of aircraft-released fluorescent particles, sampled along the vertical, after several kilometres travel in the free atmosphere. Whilst the experiments are few in number and the conditions often did not strictly conform to the conditions of isotropy and homogeneity required by the theory, the results are satisfactorily consistent with the prediction formulae and imply an effectively constant ratio between the scales of the Lagrangian and Eulerian time-correlograms. *Subject Headings:* **1. Lagrangian and Eulerian time-correlograms 2. Particle cluster expansion 3. Atmospheric turbulence 4. Turbulent diffusion of clusters of particles.**—*Author's abstract.*

GENERAL CIRCULATION (551.513)

See also: **Antarctic atmospheric circulation, 1957** (Rastorguev, Al'vares), 12.9–33; **Pamir—Tian Shan aerological expedition, 1956** (Romanov), 12.9–40; **Sunspots and atmospheric circulation** (Spitsyna), 12.9–175; **Solar activity, atmospheric circulation and temperature fluctuation** (Vitel's), 12.9–176; **Solar activity and general circulation** (Rakipova), 12.9–178; **Weather and circulation of Aug. 1960** (Stark), 12.9–271; **Tropical storms** (Landsberg), 12.9–319; **Jet stream clouds, Middle East** (Eltantawy), 12.9–376; **Snowfall, Ruwenzori, East Africa** (Whittow), 12.9–397; **Climatic changes** (Willett), 12.9–421.

12.9–316 551.513

Fleagle, Robert G. (*U. of Wash., Seattle, Wash.*), **The general circulation.** *Science Progress*, London, 48(189):72–81, Jan. **1960.** 2 figs., 13 refs.; 3 eqs. **DLC**—Certain persistent and recurrent features are evident on any series of 500 millibar charts. Five of these features are discussed and theoretically explained in this paper. It is shown in this context that the linearized theories of baroclinic instability represent at least a skelton theory of the general circulation. The problems of greatest current interest with regard to general circulation are also enumerated. *Subject Heading:* **1. Atmospheric circulation.**—*I.S.*

12.9–317 551.511:551.513.1:551.515.13

Adem, Julian and Lezama, Pedro (*both, Univ. Nat. de Mexico*), **On the motion of a cyclone embedded in a uniform flow.** *Tellus*, Stockholm, 12(3):255–258, Aug. **1960.** table, refs., 6 eqs. **DWB**—Using the barotropic model, an analytical expression for the motion of a cyclone embedded in a uniform flow is obtained. The solution contains as parameters the radius of the

ortex, the maximum velocity in the vortex, the velocity of the uniform flow and the variation f the Coriolis parameter. It is shown that, if the variation of the Coriolis parameter is eglected, a cyclone initially embedded in a uniform flow moves with the velocity of the flow. lowever, superimposed with that motion there always exists a north-westward translation ue to the variation of the Coriolis parameter that in some cases represents a non-negligible ercentage of the total displacement of a hurricane. *Subject Headings:* **1. Cyclonic motions 2. Hurricane displacements 3. Atmospheric circulation mechanics.**—*Authors' abstract.*

12.9–318 551.513.2:551.557.5:551.43(235.2)

Pogosian, Kh. P. and Ugarova, K. F., **Vliianie tsentral'noaziatskogo gornogo massiva na ormirovanie struĭnykh techenii.** [Influence of the Central Asia mountain massif on jet stream ormation.] *Meteorologiia i Gidrologiia*, Moscow, No. 11:16–26, Nov. **1959.** 5 figs., 2 tables, 8 refs. **DWB, DLC**—A series of individual and mean monthly vertical atmospheric sections etween the equator and the north pole along different meridians and during different seasons ver Eurasia and North Africa were constructed by the author, using aerological data obtained n Tibet during 1957–1959 in order to examine the seasonal variations of temperature and wind elds both in frontal zones and jet streams. Data on the position and intensity of westerly jet treams January 1957–1959 and June 1956–1958 along different meridians and mean vertical ross sections of the atmosphere, Trivandrum-SP-7 for Jan. 1959 and July 1958 mean vertical ection of the wind for a series of stations in Tibet and India, etc. are presented. The analysis hows that the jet streams observed to the north and south of the Central Asian mountain assif arise independently of one another and are not branches of a single stream; that the udden appearance of the subtropic jet over northern India in October and its disappearance in May are associated with seasonal displacements of the jet stream which here as well as in ther subtropical zones are determined by the general radiation conditions; and that the central orizontal mountain massif is not an obstacle dividing the jet stream into a northern and outhern branch. The origin and development of tropical and subtropical jet streams proceeds ompletely independently and is associated principally with zonal radiation and circulation onditions. The position of the subtropical jet streams in the transition seasons directly over he mountain massif indicates that Tibet and the Himalayas do not constitute an obstacle hindering the movement of jet streams over them. The influence of heating and cooling of ir over Tibet on the position and intensity of the subtropical jet stream is not decisive. *Subject Headings:* **1. Jet stream formation 2. Orographic effects 3. Tibet 4. Himalayas 5. Central sia mountain massif.**—*I.L.D.*

ATMOSPHERIC DISTURBANCES (551.515)

See also: **Storm surge monograph, Netherlands** (K.N.M.I.), 12.9–1; **Tornado wind damage forces, Dallas 1957** (Segner), 12.9–84; **Frontal perturbation of tropospheric scatter path** (Hay, Poaps), 12.9–103; **Radar echoes from mesosystems** (Fujita, Brown), 12.9–105; **Small area storm floods** (Newton), 12.9–128; **Microseisms from storms** (Tabulevich), 12.9–173; **Investigation of storm intensity by means of sferics** (Sievers), 12.9–268; **Hurricane beacon** (Hawkins), 12.9–274; **Glaze storm, Southern Ontario** (Thomas), 12.9–288; **Gust analysis** (Toyama), 12.9–289; **Motion of a cyclone** (Adem) 12.9–317.

12.9–319 551.515(213):551.513.1:551.571

Landsberg, H. E. (*U. S. W. B., Wash., D. C.*), **Do tropical storms play a role in the water alance of the Northern Hemisphere?** *Journal of Geophysical Research*, Wash., D. C., 65(4): 305–1307, April **1960.** 2 tables, 9 refs. **DLC**—Tropical storms have a definite role in the eneral circulation of the atmosphere. They dissipate an important portion of the potential latent) energy stored in the form of water vapor by the high absorption of solar energy over he land-rich Northern Hemisphere. *Subject Headings:* **1. Tropical storms 2. General circulation 3. Northern Hemisphere water vapor distribution 4. Water vapor diffusion.**—*E.Z.S.*

12.9–320 551.515.2:551.556.1:634.94(698.2)

Brouard, N. R., **A brief account of the 1960 cyclones and their effects upon exotic plantations in Mauritius.** *The Empire Forestry Review*, London, 39(4):411–416, Dec. **1960.** 3

photos.—A brief history of forestry in Mauritius is outlined. Indian Ocean cyclones are dealt with in general and a brief account of the two recent (1960) severe cyclones is given, with a description of damage done to exotic plantations. Finally, the influence of major cyclones on the management and silviculture of the principal exotic species is discussed. *Subject Headings:* **1. Cyclones, Mauritius Is. (1960) 2. Cyclone damage reports 3. Cyclone damage to forests 4. Mauritius.**—*A.V.*

12.9–321 551.515.2(698.2):519.24

Davy, E. G., **The probability of tropical cyclones at Mauritius.** *Revue Agricole et Sucrière de l'Ile Maurice*, Port-Louis, 39(4/5):168–173, July/Oct. **1960.** 2 figs., table. **DA**—After a short historical account of the cyclones which raged over Mauritius Island for the last 4 centuries, the author analyzes the wind-recordings made at Pamplemousses which indicate speeds higher than 25 m.p.h. A diagram gives the hourly speed of wind at Pamplemousses during cyclones and shows the random distribution in time and intensity. The fig. 2 gives the frequency of cyclonic wind speeds in the last 85 yrs (1876–1960) and the intensity of cyclones in each month (Nov. to May) over 85 yrs are summarized in a table. An analysis of these statistics permits to draw conclusions as guidance on the chances of cyclone occurrence in any year, planning for cyclone damage and cyclone occurrence in future years. *Subject Headings:* **1. Tropical cyclones, Mauritius Is. 2. Tropical cyclone statistics 3. Tropical cyclone frequencies 4. Cyclonic wind speed frequencies 5. Mauritius.**—*A.V.*

12.9–322 551.506.1:551.515.2:551.556.1(698.2)

Davy, E. G., **The cyclone season 1959–60.** *Revue Agricole et Sucrière de l'Ile Maurice*, Port-Louis, 39(3):124–127, May/June **1960.** fig., table. **DA**—Survey of the various cyclones which raged near Mauritius Island during 1959–60. Eight tropical depressions were reported, of which only 4 reached a great intensity and affected parts of firm land. The author describes in detail the "Carol" cyclone, probably the most intense cyclone ever recorded in the south-west Indian Ocean and certainly the most severe registered in Mauritius during a period of over a century. At Port Louis, a pressure of 942.6 mb. was recorded and the wind speed was estimated at 160 m.p.h. The barometric minima, and maxima wind speeds recorded during the most severe cyclones observed since 1892 are tabulated. *Subject Headings:* **1. Cyclones, Mauritius Island (1959) 2. Cyclone "Carol" 3. Cyclone statistics 4. Mauritius.**—*A.V.*

12.9–323 551.501.81:551.515.2

Jordan, Charles L. (*U. S. W. B., Wash., D. C.*), **Aerial reconnaissance of hurricanes.** (In: Caribbean Hurricane Seminar, Ciudad Trujillo, Feb. 1956, **Final Report of the Seminar**, pub. **1956.** p. 122–140. 7 figs., 9 refs.) **DWB**—The relative advantages of low level penetrations, upper level penetrations and peripheral reconnaissance are compared. Reconnaissance data substantiate the concept of a basic model of tropical cyclones as a warm-core disturbance of great vertical extent. The concept of the eye as a congruent area of low pressure, weak or calm winds and little cloudiness is a gross over-simplification. Location of the eye is often made from radar scope. However, wind field and the barograph trace are the primary criteria in determining the extent of the eye. Both the state of the sea and electrical activity in tropical cyclones are viewed critically. *Subject Headings:* **1. Hurricane reconnaissance 2. Radar hurricane location.**—*E.Z.S.*

12.9–324 551.515.2(265/266

Typhoons of the western North Pacific, 1959. *Mariners Weather Log*, Wash., D. C. 4(3):60–66, May **1960.** 2 figs., table. **DWB**—During 1959, 17 typhoons were recorded in the area of Western North Pacific. In Figure 5, the movements of these typhoons are shown. The first typhoon "Tilda" occurred on April 15–21. Its area of location was 5.5°N, 198.2°E. It came within 250 miles of Guam and then turned north-ward and disappeared south-west of Iwo Jima. Similar accounts of 16 other typhoons are given. *Subject Headings:* **1. Typhoon 2. Typhoon case histories 3. Western North Pacific.**—*A.H.K.*

12.9–325 551.506.1:551.515.

*U. S. Navy. Fleet Weather Central, Miami, Fla., **Annual tropical storm report, 195 (i.e. 1959 Hurricane Season in the Atlantic, Caribbean and Gulf of Mexico).** Its *OPNA*

eport 3140.9, (issued 1960?). 131 p. Numerous figs. and charts. Annex A is the Annual Weather Reconnaissance Report from Airborne Early Warning Squadron FOUR. **DWB** M15.2 U585as)—The discussion in this report is organized into four parts. Pt. I discusses nd evaluates the forecasting and observational techniques employed in arriving at the conusions promulgated in the warnings. In Pt. II a summary of the tropical storm season, ncluding individual storm data, consisting of maps largely, is given. Pt. III contains a mmary of certain special research and evaluation projects conducted by this facility. Adinistrative procedures are discussed in Pt. IV. Annex A consists of airborne Early Warning quadron FOUR Annual Hurricane Reconnaissance Report. *Subject Headings:* **1. Annual urricane reports 2. Hurricane season reports.**—*I.S.*

12.9–326 551.515.21:551.509.327:551.515.23

Sharapov, A. V., **K voprosu ob evoliutsii taĭfonov.** [On the problem of typhoon develop-ent.] *Dal'nevostochnyĭ Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy,* o. 7:33–45, **1959.** fig. (fold), 8 tables, 3 refs. **DWB**—This study on the development of yphoons is based upon a total of 14 typhoons observed during the expedition of the Vitiaz in he northwestern part of the Pacific Ocean during Sept. 12–Nov. 11, 1955 and June 6–Oct. 11, 957. The four stages of typhoon development, used in forecasting areas of safety for ships, amely: (1) the stage of tropical depression (initial), (2) stage of actual typhoon; (3) stage of ransformation of the typhoon into a polar front cyclone and (4) stage of the transformed yclone, are described briefly and the fundamental properties of typhoons at each of the stages s revealed in the fourteen typhoons that have been investigated and analyzed. Data are resented on the monthly distribution of the typhoon and tropical depressions and on the main eatures of the typhoons period, coordination of place of origin, pressure in the center diameter f external isobars, direction and rate of motion and duration for each developmental stage. A map showing the trajectories of the development of the typhoon is included. *Subject Headings:* **1. Typhoon development 2. Forecasting typhoon trajectories.**—*I.L.D.*

12.9–327 551.515.23(529)

Hsu, Y. C., **Report on Typhoon "Freda."** *Meteorological Bulletin,* Taipei, Formosa, (4):45–51, Dec. **1956.** 16 figs., 4 tables. In Chinese. **DLC** (Orientalia)—The passage of "Freda" on Sept. 1956 has been described in detail. Its position, appearance and development at 20.0°N, 128.1°E; towards SE at 500 miles from the Taiwan; maximum wind speed at 55 miles/h) are given. Subsequent observation follows up to Sept. 18 and describes an hourly notion and variation in its early development the effects and causes of westerly direction and ts relation to vertical chart of upper layer wind at 300 mb (Fig. 2). The characteristics of the ormation—particularly the central composition and its minor elements—were discussed, such s inflection point and small closed low pressure cell, as shown in a number of figures. It also iscusses the relation between Freda's influence as it passed through Taiwan Strait and weather variation through Taiwan, dealing with wind speed and direction, air pressure, and rainfall amount at the same time in each area. The results are tabulated and illustrated. *Subject Headings:* **1. Typhoon "Freda" (1956) 2. Formosa.**—*K.C.*

12.9–328 551.515.23(267)

Johnson, A. C., **Tropical revolving storm [on the] Arabian Sea.** *Marine Observer,* London, 30(189):122–123, July 1960. fig. **DWB, DLC.**—Report of weather at ship 22–24th May 1959 when passing near a storm in the Arabian Sea. The Indian Meteorological Department comments that such storms are infrequent in the Arabian Sea. The last one reported occurred in May 1941. The S. S. Socotra on passage from Aden to Karachi passed practically through the center of the storm which probably did not have a calm center. The swell from the storm caused considerable havoc along the west coast of India. *Subject Headings:* **1. Tropical storms 2. Arabian Sea.**—*R.B.*

12.9–329 551.515.3:551.556.1(73)

Beebe, Robert G. (*Midwest Wea. Service, Kansas City, Missouri*), **Tornadoes during 1959.** *Weatherwise,* Boston, 13(1):15–18, Feb. **1960.** 2 figs. **DWB**—During 1959 a total of 580 tornadoes (58 deaths) was reported, a figure appreciably less than the totals for 1952–1958.

Funnel clouds were not classified as tornadoes this year, and this may partly explain the difference. A map shows total tornado occurrences by states. Individual tornadoes or series of tornadoes are briefly described. The most devastating outbreak occurred Feb. 9–11 in the area of Missouri (21 persons killed in St. Louis), Illinois, Indiana, and Ohio. Miami had a highly unusual tornado which left a property damage of $3,000,000. Tornado research is expected to increase in the spring of 1960 with several agencies collaborating. *Subject Headings:* **1. Tornado frequency charts 2. Tornado damage 3. U.S.A.**—*R. S. Quiroz.*

12.9–330 551.511.2:551.515.3:551.556.4

Lacaze, J., **Tourbillons atmosphériques d'axes verticaux: tourbillons de sable, Pt. 2.** [Vertical atmospheric vortices: sand whirls, Pt. 2.] *Journal de Mécanique et de Physique de l'Atmosphère*, Paris, Ser. 2, 1(1):25–41, Jan./March **1959,** (successor to *Journal Scientifique de la Météorologie*). 4 figs., 2 tables, 4 refs., 72 eqs. French, English and Spanish summaries. **DWB**—In Pt. 1 (*see* 11.8–253, Aug. 1960, *Met. Abstracts*), the author showed the basic equation of motion of viscous fluids. In Pt. 2, he applies the equations of motion of a particle of viscous fluid, in which an angular vertically rotating speed is introduced. It is first supposed that this initial rotation affects the fluid at the level of the discontinuity surface which may reach a kilometer (very high with respect to the diameter of usual sand whirls). It is admitted that vertical surfaces of discontinuity exist, and hence frictional waves bearing vertical crests. These waves create a vertical vortex. Assuming isothermal conditions, the part played by viscosity is of prime importance, because the vertical components of velocities are intimately linked to it. It is shown that air compressibility acts in the very lower layers near the earth's surface; it explains the confining of thin jets of fluids near the ground. The part played by the temperature of sand is also taken into consideration; phenomena appear to be mostly motional. On the other hand, although the granulometric density of sand whirls is extremely changeable, they leave no traces through tangible soil lowering. The thin jets of air, taking sand grains from the ground come from high, and it can not be stated whether their temperature at ground level is high, and whether the sand, even when its temperature reaches 90°C has time for heating them much during its ascent. *Subject Headings:* **1. Fluid motion 2. Vortex dynamics 3. Whirl winds.**—*A.V. and author's abstract.*

12.9–331 551.515.4(529)

Hwang, K. P., **Thunderstorms in Taiwan.** *Meteorological Bulletin*, Taipei, Formosa, 2(3):32–34, Sept. **1956.** tables, 3 refs. In Chinese. **DLC** (Orientalia)—This paper gives mainly the statistical tabulations on the subject of the classification of thunderstorms and its developmental condition: in particular, mean frequency of thunderstorm development at each hour for a day from 1911 to 1946 in 13 areas, monthly mean development of thunderstorm for 1900–1946 in the same area, monthly mean precipitation by thunderstorm in each area during 1937–1946, and monthly damage including human, animal, and building during 1925–32. Brief account on the distribution of thunderstorm has dealt with its seasonal and regional differences. *Subject Headings:* **1. Thunderstorm variations 2. Formosa.**—*K.C.*

12.9–332 551.515.53:523.74

Raghavan, K. (*Met. Office, Poona, India*), **Solar influences on the monsoon storms in the Bay of Bengal.** *Weather*, London, 16(2):59–64, Feb. 1961. 6 figs., 8 refs. **DLC** (QC851.W4)—A study has been made of the number of storms which struck the coastal area of Midnapur and 24 Parganas districts, in which Calcutta is situated, during the monsoon months of 1923–1959. The five year overlapping means show that there is a general tendency for a periodic rise and fall in the number of these storms. As there is no periodicity in the over-all number of storms appearing over the Bay of Bengal, it is thought that the variations are due to the migrations of the Tibetan high which during some periods deflects the storms away from the area. A study of the mean winds at 1, 2, and 3 and 4 km over Calcutta tends to support this hypothesis. The migrations southwards of the Tibetan high towards the bay may be generally expected during the maximum epoch of sunspot numbers when the flare-ups of ultra violet radiation give rise to greater warming of the upper atmosphere. *Subject Headings:* **1. Solar effects on the weather 2. Tibetan anticyclone 3. Bay of Bengal storms.**—*R.B.*

12.9–333 551.515.8:551.553.8

Doroshenko, F. T., **O prichinakh vozniknovseniia shkvalov.** [The causes of squall formation.] *Meteorologiia i Gidrologiia*, Moscow, No. 4:28–31, April **1960.** 5 eqs. **DWB, LC**—The author presents a new explanation for the descending air movement in the rear of moving cumulus and cumulo-nimbus clouds, and of the sudden rise in pressure and intensification of wind at the surface of the earth. By means of a physical analysis and calculation, it is shown that during the variation of wind with height in a region of intense ascending currents, there arises a tremendous pressure gradient between the rear and front of an ascending current of air as a consequence of the inertia of the mass of air of this current. The resulting supplementary pressure gradient is imposed upon the existing pressure gradient from which its direction deviates to the right by 90°; the wind also deviates to the right and its velocity exceeds that of the gradient wind but does not reach the velocity corresponding to the supplementary gradient. The maximum increase in pressure in the rear of an ascending current takes place in the middle of a cumulo-nimbus cloud where the ascending currents obtain a maximum velocity. The air accumulated as a result of the retardation of the horizontal flow descends in the rear of the ascending currents. Favorable conditions for the downward air movement in the rear of ascending currents are formed along cold fronts; here large pressure gradients extend to the surface of the earth producing brief intensification of winds up to 20–30 m/sec and more. On the assumption that wind strength increases with altitude in the vicinity of a cloud, the descending air in the rear of a cloud will transport large wind velocities to the surface of the earth. The effect of precipitation and, hence, cooling of the atmosphere upon the intensity of descending air currents, etc., are discussed. With the aid of the formula for computing the pressure force it is shown that the baric gradient arising in ascending clouds, and, hence wind velocity during a squall, is proportional to the air density at the level of the maximum velocity of the ascending motion, velocity of ascending motion and local variation of velocity with height at the level of large velocities of ascending motions. Since the velocity of ascending currents depends upon the stratification of air masses and specific humidity of the air, the wind velocity in squalls also depends upon these. Large temperature contrasts at fronts favor the origin of squalls by facilitating ascending currents. Squalls along a front are observed most frequently when the front is meridionally situated and moves earthward. Under such circumstances the thermal wind coincides with the direction of the wind at the surface of the earth so that a constant increase of wind velocity with height is favored. *Subject Heading:* **1. Squall formation.**—*I.L.D.*

RADIATION AND TEMPERATURE

RADIATION (551.521)

See also: **Radiation balance, Arctic** (Gavrilova), 12.9–26; **Atmospheric Ozone and Radiation Symposium, Oxford 1959** (WMO Bull.), 12.9–48; **Oxford Radiation Symposium, 1959** (I.U.G.G.), 12.9–50; **Radiation and evapotranspiration of grass** (Scholte Ubing), 12.9–77; **Upper air radiation, Northern France** (Misme), 12.9–101; **Albedo of sea** (Ter-Markariants), 12.9–114; **Thermal history of Earth** (MacDonald), 12.9–150; **Solar flares and cosmic rays** (Sakurai), 12.9–179; **Cosmic ray impact on meteorites** (Geiss, Oeschger), 12.9–194; **Measurement of geomagnetic field, Capetown** (Heirtzler, Hirshman), 12.9–197; **Interaction between conducting medium fluxes** (Zhigulev, Romishevskiĭ), 12.9–200; **Oxygen radiations 6300 and 5577 Å** (Barbier, Glaume), 12.9–224; **Red line of night sky at equator** (Delsemme A., Delsemme D.), 12.9–225; **Oxygen red line in night airglow and ionos. F_2 region** (Huruhata et al), 12.9–226; **Origin of sodium airglow** (Potter, Del Duca), 12.9–228; **Terrestrial radiation belts** (Crawford), 12.9–229; **Terrestrial and solar magnetization, outer Van Allen belt** (Bailey), 12.9–230; **Cosmic ray measurement on lunar space rocket** (Kurnosova), 12.9–250; **Cosmic measurement on geophysical rockets** (Shafer, Iarygin), 12.9–251; **Satellite cosmic ray observations** (Vernov et al), 12.9–252 to 12.9–255; **Horizontal visibility theory, Bouguer, Lambert** (Middleton), 12.9–432.

12.9–334 551.521.1:551.521.11(495)

Macris, George Jac. (*Nat. Obs. of Athens, Greece*), **Solar energy and sunshine hours at Athens, Greece.** *Monthly Weather Review*, Wash., D. C., 87(1):29–32, Jan. **1959.** 5 figs.,

table, 12 refs. **DWB, DLC**—The linear relationship between total daily amount of solar radiation incident on a horizontal surface and the hours of sunshine: $\frac{Q}{Q_0} = a + b\frac{S}{S_0}$ (ÅNGSTRÖM 1924) makes it possible to make a quantitative estimate of solar radiation amounts in cases where only sunshine measurements have been made for an extended period of time. This relationship was used at Athens, Greece, where records of sunshine hours extended from 190 but solar radiation measurements for only a few years. The depletion of solar energy by the atmosphere is discussed. Frequency distribution histograms of total hours of sunshine were determined on the basis of records from 1901 until 1956. *Subject Headings:* **1. Solar radiation 2. Sunshine duration data 3. Athens, Greece.**—*E.Z.S.*

12.9–335 551.506.3:551.521.12(675

*Institut pour la Recherche Scientifique en Afrique Centrale, Brussels, **Observations du rayonnement solaire à Lwiro, période 1954–1959.** [Observations of solar radiation at Lwiro 1954–1959.] 80 p. Almost entirely tables. Mimeo.—The publication contains the fundamental data obtained at the solar radiation station Lwiro, between 1954 and 1959. The hourly values of the global radiation on a horizontal surface, of the diffuse radiation on a horizontal surface, and of the direct radiation are presented in tables, day by day, for the different months of 1956–1957; the diurnal sunshine durations are given month by month for 1954–1957. *Subject Headings:* **1. Solar radiation data 2. Lwiro, Belgian Congo 3. Institut pour la Recherche Scientifique en Afrique Centrale, Belgium.**—*A.V.*

12.9–336 551.501.724:551.507.362.2:551.521.1

†Houghton, J. T. (*Clarendon Lab., Oxford*), **The meteorological significance of remote measurements of infra-red emission from atmospheric carbon dioxide.** *Royal Meteorological Society, Quarterly Journal*, 87(371):102–104, Jan. **1961.** 2 figs., 7 refs. **DWB, DLC**—Observation from outside the atmosphere of the emission from different wavelength regions in the 15μ carbon-dioxide band, would give information of the vertical temperature distribution between 10 and 50 km altitude. The measurements required are feasible using a Fabry-Perot interferometer, and sample calculations of the depth in the atmosphere of the origin of this emission are presented. *Subject Headings:* **1. Infra-red emission measurements 2. Atmospheric carbon dioxide in the atmosphere 4. Vertical temperature distribution.**—*Author's abstract.*

12.9–337 551.521.3:551.593.54

Paszyński, Janusz, **Wstępne wyniki badania przezroczystości atmosfery w Bydgoszczy** [Preliminary results of a study of atmospheric transparency at Bydgoszcz.] *Przegląd Geofizyczny*, Warsaw, 4(2):107–120, **1959.** 2 figs., 3 tables, 7 refs. French summary p. 120. **DWB, DLC**—The methods and preliminary results of an investigation of solar direct radiation carried out with the aid of Moll-Gorczinsky actinometers simultaneously at several points of the city with the purpose of determining the difference in the reduction of the atmospheric transparency caused by the urbanization and industrial conditions of the city are presented in a series of tables and graphs and are discussed. The measurements made in Sept.–Oct. 1955 have shown a daily variation of the turbidity factor characterized by a minimum at noon, caused by changes of wind direction, and the city's location in the Brda Valley which is the cause of a notable increase of turbidity in the mornings and evenings. *Subject Headings:* **1. Atmospheric transparency 2. Atmospheric turbidity 3. Bydgoszcz, Poland.**—*A.M.P.*

12.9–338 551.521.32:551.576.1

Herman, Benjamin M. and Abraham, Farid F. (*both, Univ. Arizona*), **A note on the two-stream theory of radiational transfer through clouds.** *Journal of Meteorology*, Boston 17(4):471–473, Aug. **1960.** 3 figs., 6 refs., 18 eqs. **DWB, DLC**—Although various shortcomings are inherent in the two-stream theory and the method at best represents only an approximation to the actual physics of the radiational-transfer problem, nevertheless, it does permit one to make approximate calculations of the radiational transfer through clouds. In setting up the differential equations for the upward and downward beams within the cloud the scattered light is expressed as multiplied by the difference between the total radiation intercepted by a drop and the amount absorbed by the drop. If we let the amount of radiation

tercepted by a drop be given by I_0, and the amount absorbed by a drop be given by I_{0x} then e scattered light, I_s is given as $I_s = BI_0$. Since the absorption coefficient of liquid water in the sible and near infra-red regions of the spectrum is rather small, the parameter $(I_0 - I_{0x})$ will t differ greatly from I_0. Therefore, for solar-energy transfer, the error resulting from the e of the incorrect expression for the scattered light will not be large. However, the error ould be considerable when dealing with the infrared-red transfer of terrestrial radiation rough clouds. It was thought advisable to set up the corrected form of the equations and lve them, following the method as originally used by SCHUSTER. *Subject Heading:* **1. Radiation transfer through clouds.**—*E.Z.S.*

12.9–339 551.521.32

Kondrat'ev, K. Ia. and Gol'm, T. S., **Nekotorye rezul'taty izmerenii teplovogo izlucheniia tmosfery v dnevnoe vremia.** [Some results of measurements of the thermal radiation of the tmosphere during the daytime.] *Meteorologiia i Gidrologiia*, Moscow, No. 11:37–40, Nov. 959. 4 figs., 4 refs., eq. **DWB, DLC**—The authors present the procedure and results of an ttempt to measure directly the thermal radiation of the atmosphere. During the daytime a rystalline germanium light filter was used since it filters out completely short wave radiation ith a wave length $\lambda < 1.5\mu$ and is transparent to a wide range of infrared radiation from several microns to tens of microns. Observations were made during the summer of 1956 in the Elbruz egion and in the fall in Koltushakh in Leningrad region. The results of calculations of angular istributions of the intensity of effective radiation on the Elbruz, the angular distribution of elative intensity of effective radiation in Koltushakh, during a continuous low cloud cover and he daily variation of counter radiation of the atmosphere, of the air temperature and absolute umidity are presented on graphs. It is shown that all the results of observations are in full greement with the theoretical variation of thermal radiation of the atmosphere. *Subject leadings:* **1. Thermal radiation measurements 2. Atmospheric thermal radiation 3. Leningrad Region, S.S.R.**—*I.L.D.*

TEMPERATURE (551.524)

See also: **Inversion over E. N. Pacific** (Neiburger et al.), 12.9–12; **Meteorology and heat load requirements** (Murphy), 12.9–85; **Portland cement weathering test** (Legg), 12.9–86; **Solar activity, atmospheric circulation and temp. fluctuations** (Vitel's), 12.9–176; **Diurnal temp. variations** (Jordan), 12.9–283; **Inversions and air pollution** (Meade), 12.9–297; **Eddy diffusivity** (Ogura), 12.9–313; **Supercooled precipitation, Ukraine** (Volevakha), 12.9–396; **Snow and frost in Taiwan** (Hwang), 12.9–398; **Air temp. over Black Sea** (Zemliakov), 12.9–419; **Heat wave mortality, Melbourne** (Rankin), 12.9–429.

12.9–340 551.524.1:551.511:551.551

Iaglom, A. M., **Über die lokale Struktur des Temperaturfeldes einer turbulenten Strömung.** [Local structure of the temperature field in turbulent flow.] (In: Limberg, Helmut, (transl.), **Sammelband zur statistischen Theorie der Turbulenz.** Berlin, Akademie Verlag, 1958. p. 141–146. 14 refs., 19 eqs.) **DLC** (QA911.L47)—An endeavor is made to ascertain OBUKHOV's results on the local structure of a temperature field in turbulent flow with the aid of equations of hydrodynamics. An equation for the diffusion of material in a medium is satisfactory for the temperature field. A turbulent movement can be considered as local-homogen and local-isotrop in the case of big Reynolds numbers. An equation for determination of the balance velocity of the temperature field is derived, similar to that determining the dissipation of kinetic energy, the constant of which introduced by OBUKHOV leads to a relation of the structural functioning. Neglecting the coefficients of large and small distances, the magnitude without dimensions can be considered in its relation to the calculus. Its constant is always negative in cases of sufficiently large distances. Applying Obukhov's "two-third norm" to the obtained equation of the velocity field and by interpolation of all distance values computed by Obukhov up to the limit of the measure of turbulence, the graphical representation of the temperature field will show according to the distances a one parametric group of curves or only one universal curve. *Subject Headings:* **1. Turbulent flow 2. Temperature field in turbulent flow.**—*O.T.*

12.9–341 551.524.31:551.43(789)

von Eschen, G. F. (*U. S. W. B., Albuquerque, N. Mexico*), **Nighttime temperature rises in mountain canyons.** *Monthly Weather Review*, Wash., D. C., 88(2):70–71, Feb. 1960. fig. **DWB, DLC**—The phenomenon of temperature rise in the Cochiti Canyon of New Mexico at midnight is discussed. A thermograph station was established at Tijeras Ranger Station. This station recorded nighttime temperature rise and subsequent fall, 42% of the days during 1959. This rise and fall in the temperature varied from a few degrees to 20 degrees. The same phenomenon probably occurs in many other mountain canyons of the west. Figures show the rise and fall of the temperature at Tijeras Ranger Station. *Subject Headings:* **1. Nocturnal temperature rise 2. Temperature in canyons 3. Orographic effects on temperature 4. Cochiti Canyon, New Mexico.**—*A.H.K.*

12.9–342 551.524.32:551.524.35(47)

Aksarina, E. A. and Novskaia, A. I., **Kharakteristika anomaliĭ srednikh mesiachnykh temperatur vozdukha v Primorskom krae.** [Characteristics of monthly mean air temperature anomalies in the Maritime Territory.] *Dal'nevostochnyĭ Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 7:138–148, **1959.** 3 figs., 4 tables, 4 refs. **DWB**—After a brief survey of studies of temperature anomalies in the U.S.S.R., the authors investigated the characteristics of the distribution of mean monthly atmospheric temperature anomalies in the Primore Territory and attempted to establish laws of the transition of anomalies from month to month. With the aid of data presented in graphs and tables, the authors discuss the distribution of normals and anomalies of mean monthly atmospheric temperatures, variation of magnitudes of anomalies and duration of periods of conservation of normals and anomalies of atmospheric temperatures and relationship between anomalies of mean monthly temperature of individual months. The values of the anomalies of mean monthly atmospheric temperatures fluctuate from 0.1 to 8.8°C. Anomalies greater than 1.0°C predominate during the cold half of the year. In the warm half of the year, except July and August, the prevailing anomalies are up to 1.0°C: in July (at all stations) and in August (in Iman, Maikha, Suchan and Margaritovo) the most frequent anomalies are greater than 1.0°C. The most frequent anomalies are between 1.1° and 2.0°C; with increase in magnitude of the anomaly the number of instances diminishes sharply. Anomalies greater than 6.0°C are very rare. Anomalies up to 4.0°C occur at all stations during the entire year. An exception is Sept. in which anomalies never exceed 2.0°C. Anomalies greater than 4.0°C occur usually during the cold half of the year. Positive anomalies are more frequent than negative ones. From month to month the magnitude of the anomaly diminishes in 67–100% of the cases. Relationships were obtained between anomalies of initial months and a series of following (one, two, three and 6 months apart) months for the Primore Territory and also between anomalies of the first pentad and the entire month for Vladivostok and Iman with a probability of 70–100%. *Subject Headings:* **1. Mean monthly temperature data 2. Temperature anomalies 3. Maritime Territory, U.S.S.R.**—*I.L.D.*

12.9–343 551.590.21:551.524.34:551.583.1

†Callendar, G. S. (*Ministry of Supply, London*), **Temperature fluctuations and trends over the earth.** *Royal Meteorological Society, Quarterly Journal*, 87(371):1–12, Jan. **1961.** 4 figs., 2 tables, 28 refs. **DWB, DLC**—The annual temperature deviations at over 400 meteorological stations are combined on a regional basis to give the integrated fluctuations over large areas and zones. These are shown in graphical form, and it is concluded that a solar or atmospheric dust hypothesis is necessary to explain the worldwide fluctuations of a few years duration. An important change in the relationships of the zonal fluctuations has occurred since 1920. The overall temperature trends found from the data are considered in relation to the homogeneity of recording, and also to the evidence of glacial recession in different zones. It is concluded that the rising trend, shown by the instruments during recent decades, is significant from the Arctic to about 45°S lat., but quite small in most regions below 35°N and not yet apparent in some. It is thought that the regional and zonal distribution of recent climatic trends is incompatible with the hypothesis of increased solar heating as the cause. On the other hand, the major features of this distribution are not incompatible with the hypothesis

increased carbon dioxide radiation, if the rate of atmospheric mixing between the hemispheres a matter of decades rather than years. *Subject Headings:* **1. Secular temperature variations Climatic trends 3. Solar influences 4. Carbon dioxide radiation influences on temrature.**—*Author's abstract.*

12.9–344 551.524.34:551.583.14

Wexler, H. (*U. S. Weather Bureau, Washington*), **Additional comments on the warming end at Little America, Antarctica.** *Weather*, London, 16(2):56–58, Feb. 1961. fig., 3 refs. LC (QC851.W4)—This paper adds to, and amends data for the six years 1911–12, 1929–30, 34–35, 1940–41, 1958 and 1957, which was published in an earlier paper by WEXLER in 59. New trend curves are drawn based on smaller but more comparable periods in each of e years. The curve based on data for each calendar year shows a warming trend of 0.100°F $^{-1}$, that based on data for the 10 month period omitting Feb. and March gives a trend of 110°F yr^{-1} and that for 9 months, April to Dec. gives a trend of 0.103°F yr^{-1}. *Subject eadings:* **1. Secular warming 2. Little America, Antarctica.**—*R.B.*

SOIL TEMPERATURE (551.525)

See also: **Thermal history of Earth** (MacDonald), **12.9–150.**

12.9–345 551.525.5(719)

Ives, J. D. (*McGill Sub-Arctic Research Lab., Schefferville, P. Q.*), **Permafrost in central abrador-Ungava.** *Journal of Glaciology*, London, 3(28):789–790, Oct. 1960. fig., ref. WB, DLC—Permafrost is much more extensive south of the 55th parallel in Canada than has therto been believed. The thickness locally exceeds 80 m. This is apparent from the sults of the work done by the Iron Ore Company of Canada and members of the McGill b-Arctic Research Laboratory from 1957 onwards which is reviewed here. *Subject Headings:* **Permafrost distribution 2. Northern Canada.**—*R.B.*

12.9–346 551.525.5:551.579.2:551.457

Maslov, B. S., **Promerzanie i ottaivanie torfianoi pochvy v usloviiakh Meshcherskoi izmennosti.** [Freezing and thawing of a peat soil under the conditions of Meshera lowland.] *ochvovedenie*, Moscow, No. 11:93–99, 1960. 7 tables, 8 refs. English summary p. 99. DLC. ransl. into English in corresponding issue of *Soviet Soil Science*, Wash., D. C. DLC—Three-ear field observations on freezing of different drainage intensity low moors revealed that round waters appreciably affect the depth of freezing only at small depths, (less than 1.0 m). correlation has been found between the depth of freezing and the thickness of the snow cover efore snow thawing. Moisture accumulation in the upper 30 cm layer makes in average 3.1 mm during winter. Thawing intensity of the peat depends upon microrelief and is etermined by air temperature. The general way of snow water filtration are thawing «craters» hich are formed in furrows with shallow freezing depth. The runoff on the intensely drained ogs is small. *Subject Headings:* **1. Soil moisture 2. Peat soil properties 3. Freezing soils.** —*Author's abstract.*

WATER TEMPERATURE (551.526)

See also: **Open water effects on Arctic heat balance** (Laĭkhtman, Kliuchnikova), **12.9–27.**

12.9–347 551.526.6

Lumb, F. E., **Seasonal variation of the sea surface temperature in the coastal waters of he British Isles.** *Great Britain. Meteorological Office, Scientific Papers* No. 6, 1961. 21 p. 3 plates, 3 figs., 14 refs. DLC—Quite large gradients of sea surface temperature are present ound the coasts of the British Isles for much of the year, and the pattern of sea surface iso-herms is complex in summer. A study of the temperature gradients and isotherm patterns nd an understanding of how they are caused is necessary in order to be able to interpret the ea temperature readings from light-vessels and ships in coastal waters. Also a knowledge of he sea surface temperature distribution in coastal waters can be a valuable aid to local forecast-

ing (for example, coastal fog and low stratus). *Subject Headings:* **1. Sea surface temperature 2. Coastal-waters of British Isles.**—*Author's abstract.*

PRESSURE AND WIND

PRESSURE (551.54)

See also: **Arctic trop. geopotential—velocity var.** (Godson), 12.9–24; **Relations between bronchial asthma and press. pattern** (Nemoto), 12.9–92; **Atmospheric oscillations and Earth's rotation** (Sekiguchi), 12.9–145; **Explosive waves from eruption of Volcano Sakurajima** (Yasui, Ijichi), 12.9–158; **Deviation of geostrophic wind** (Worthley), 12.9–355; **Analysis of contour charts** (Corby), 12.9–263.

12.9–348 551.541:551.558.21(234.3

Gerbier, N. and Berenger, M., **Experimental studies of lee waves in the French Alps.** *Royal Meteorological Society, Quarterly Journal*, 87(371):13–23, Jan. **1961.** 22 figs. **DWE DLC**—Report on experimental studies of lee waves in the French Alps. Observations were made during 1956–1959 through the cooperation of La Météorologie Nationale, the Service de la Formation Aéronautique du Travail Aérien et des Transports, and the Comité d'Action Scientifique de la Défense Nationale. The National Gliding Centre at St. Auban sur Durance was selected as the base for the field work. The chief items of equipment, radiosonde, radar, gliders, zero-lift balloons and powered aircraft assembled for the research are described. The details of all the observations are not given here; they are available in a report by GERBIER and BÉRENGER (*Monographié de la Météorologie Nationale*, Aug. 1960). Some conclusions about the influence of the invariant factor, relief, and the varying factors, wind and air mass on wave formations are given. Most of the time the waves in the lee of a mountain chain do not behave according to a simple pattern. There is often more than one wave train with different wavelengths and amplitudes because the wind and air mass characteristics vary with altitude. A number of wind profiles and some of the time and space variations in the lee-wave pattern were examined. Discussion of the dependence of lee waves on the profile of wind component normal to the crest line in a stable atmosphere, the effect of diurnal variations of lapse rate, and some complex interactions. In mountainous regions three types of waves exist: lee waves accompanied by rotors when the amplitude is large, composite waves, simultaneous existence of more than one lee wave system with maximum amplitudes of different levels, and shear layer waves, progressive, sometimes unsteady, or with rotors or billows. *Subject Headings:* **1. Lee waves 2. Mountain waves 3. Wind profiles 4. St. Auban on Durance, France 5. French Alps.**—*E.Z.S.*

12.9–349 551.542:519.241.

Shapiro, Ralph (*A. F. Cambridge Res. Center*), **Specification of circulation features resulting in low persistence correlation.** *Colorado. Univ. High Altitude Obs. Inst. for Solar-Terrestrial Research, Technical Report No. 1*, corrected and reissued May **1957.** p. 122–123. **DW** (M13.1C719t)—Persistence correlation may be represented by the sum of the coefficients of a set of orthogonal polynomials:

$$P = \Sigma_i Z_i^{t_0} Z_i^{t_1}$$

where i refers to the specific coefficient, and t refers to the time period. Each of the coefficients refers to some specific feature of the pressure distribution. Z_1 represents the mean linear pressure difference between the eastern and western boundaries of the region. Thus, an increase in Z_1 represents an increase in the south to north flow, and vice versa. Z_7, representing the linear north-south pressure difference is similarly calculated at five degree intervals, with the coefficients running from -3 in the north to $+3$ in the south. Analyzing the magnitudes of the changes in the coefficients while neglecting direction of the change, the author came to the conclusion that the results of the analysis must be accounted for mainly by the changes of the pressure distribution, represented by the two coefficients, Z_1 and Z_7. *Subject Headings:* **1. Pressure distribution 2. Persistence correlation.**—*K.C.*

12.9–350 551.543:551.511:536.65

Bogdanova, N. P., **Priblizhennaia otsenka vliianiia tepla kondensatsii na izmenenie zemnogo davleniia.** [Approximate evaluation of the influence of the heat of condensation pressure changes near the ground.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 99:38–42, **1959.** 3 figs., table, 2 refs., 4 eqs. **DWB**—The author discusses the problem of the influence of heat condensation influx on the changes in surface pressure and introduces an approximate method of evaluating inflow of condensation heat. *Subject Headings:* **1. Pressure changes 2. Condensation heat influences on pressure.**—*A.M.P.*

12.9–351 551.547.3

Weil, Raoul, **Variación de la presión a 5220 metros de altura.** [Pressure variation at altitude of 5220 meters.] *Revista Meteorológica del Peru*, Lima, 5(9):16–18, June **1960.** 3 figs., refs. **DWB**—Characteristics of average pressures; daily, monthly, and seasonal variations pressure; and pressure extremes were recorded during 1957–1958 in the Chacaltaya Mountain, Bolivia (5220 m above sea level; 69°W, 16°S). Two aircraft altimeters, whose readings were photographed automatically every hour, were used. Three graphs are included: the 1st gives hourly pressure readings for Sept. 25, 1957 compared to the average reading for March, 1958; the 2nd gives average daily readings for March, April, and May, 1958, and the 3rd gives seasonal variations for 1957 and 1958 separately and then the average of the two years together. *Subject Headings:* **1. Pressure variation data 2. Chacaltaya Mt., Bolivia.**—*A.L.M.*

WIND (551.5)

See: **Computation of derivatives of met. elements** (Vetlov), 12.9–256.

TURBULENCE (551.551)

See also: **Turb. heat exchange ice-atmosphere** (Doronin), 12.9–25; **Gust effects on aircraft** (Parker), 12.9–67; **Power spectra of atmos turb.** (Zbrozek), 12.9–71; **Hodograph analysis of clear air turb.** (Reed), 12.9–264; **Electronic gust load integrator** (Tevriukov), 12.9–280; **Hypothesis of quasi-stationary layer** (Karol'), 12.9–303; **Turb. mixing in atmos.** (Monin, Obukhov), 12.9–304; **Calculating turb. coefficients** (Utina), 12.9–307; **Homogeneous and isotropic turb.** (Iaglom), 12.9–311; **Statistical description of constant fields** (Obukhov), 12.9–312; **Eddy diffusivity** (Ogura), 12.9–313; **Expansion of clusters of particles** (Smith, Hay), 12.9–315; **Temp. field in turb. flow** (Iaglom), 12.9–340; **Wind speed classification in bioclimatology** (Parczewski), 12.9–428.

12.9–352 551.551.8:533.15

Bourret, R. C., **Turbulent diffusion in two and three dimensions by the randomwalk model with memory.** *Canadian Journal of Physics*, Ottawa, 39(1):133–140, Jan. **1961.** fig., refs., 40 eqs. **DWB, DLC**—A lattice model used for the derivation of the telegraph equation for diffusion is extended to two and three dimensions. Appropriate generalizations of the telegraph equation are obtained. These equations give a fine-grained chronological description of diffusion. From these equations, the velocity autocorrelation functions of the diffusing particles are obtained. *Subject Heading:* **1. Turbulent diffusion in the atmosphere.**—*Author's abstract.*

12.9–353 551.551:551.508.54

Gaviglio, J., **Sur quelques problèmes de mesures de turbulence, effectuées à l'aide d'anémomètres à fils chauds parcourus par un courant d'intensité constante.** [Some problems of turbulence measurements made by means of constant current hot-wire anemometers.] *La Recherche Aéronautique*, Paris, No. 70:33–34, May/June **1959.** 4 figs., ref. **DLC**—Various improvements are proposed in the methods and techniques of hot-wire anemometry. Comparison of the indicated solutions with experience is made, disposing the hot wire up-stream of an air-screw in the field of the speeds. The turbulent tensions measured by means of hot wires are compared with the values deduced from measurements of drop in voltage, with the aid of the equations of motion. *Subject Headings:* **1. Turbulence measurement 2. Hot-wire anemometers.**—*A.V.*

WIND DISTRIBUTION AND VARIATION (551.552/53)

See: **Tornado wind damage forces, Dallas, 1957** (Segner), 12.9–84; **Numerical weather prediction** (Jordan), 12.9–290; **Cyclone effects on plantation, Mauritius Isl.** (Brouard), 12.9–320; **Causes of squall formation** (Doroshenko), 12.9–333.

WIND EFFECTS (551.556)

See also: **Storm surge monograph, Netherlands** (K. N. M. I.), 12.9–1; **Tornado wind damage forces, Dallas, 1957** (Segner), 12.9–84; **Surface waves at short fetches** (Kinsman), 12.9–116; **Wind effect on sea level** (Uusitalo), 12.9–118; **Cyclone season 1959–60** (Davy), 12.9–322; **Tornadoes during 1959** (Beebe), 12.9–329; **Vertical vortices** (Lacaze), 12.9–330.

12.9–354 551.556.4:581.33

Monoszon, M. Kh., **Rasseivanie vozdushnym putem pyl'tsy marevykh.** [Scattering of pollen of the goosefoot family through the air.] *Akademiia Nauk SSSR. Institut Geografii. Trudy*, No. 77:157–165, **1959.** 3 figs., 10 refs. **DLC**—The method and results of an investigation of the distance of the scattering of Agnus Castus pollen carried out by the author in June 1952 near the station of Pallasovka in Stalingrad region are described and tabulated. It has been shown that in general the pollens travel on a distance of no more than 1 km from the point of their growing and only a small part of them are carried on greater distances. *Subject Headings:* **1. Pollen scattering 2. Goosefoot family pollen scattering.**—*A.M.P.*

UPPER AIR WINDS (551.557)

See also: **Arctic trop. geopotential—velocity variations** (Godson), 12.9–24; **Horizontal drift in ionosphere, Delhi** (Mitra et al.), 12.9–214; **Obs. of ice crystal haze by radar** (Hughes), 12.9–267; **Design wind profiles** (Sissenwine et al.), 12.9–273; **Jet stream formation** (Pogosian, Ugarova), 12.9–318; **Two-stream theory of radiational transfer** (Herman, Abraham), 12.9–338.

12.9–355 551.557:551.542.3

Worthley, Leighton E., Jr., **Deviation of geostrophic wind from measured wind at 500 mb.** Hawaii. Univ. Institute of Geophysics. Meteorological Div., Contract AF 19(604)-1942, April **1959.** 13 p. 5 figs., table, 14 refs.—Use of radar navigation equipment in aerial weather reconnaissance makes possible an extensive study of the latitudinal variation of the deviation of geostrophic wind from measured wind at 500 mb. Geostrophic winds computed from height differences are compared with measured spot winds along various fixed reconnaissance tracks. The median deviation varies little poleward of 25° and is of the order of 5 kn., but deviations greater than 10 kn. may be expected 25% of the time. Median per cent deviation ranges from 35% at 30° to 87% at 8.5°; however, a median deviation of approximately 29% can be expected poleward of 30°. The investigation shows that direct wind analysis should be used equatorward of 30° and suggests that better wind forecasts would result from direct wind analysis poleward of 30°. *Subject Headings:* **1. Geostrophic-gradient wind deviations 2. Aircraft weather reconnaissance.**—*Author's abstract.*

12.9–356 551.557.3

Panenka, Ivan, **Určovanie rýchlosti vetra v hladinách 300 mb, 200 mb, 100 mb, a v tropopauze z udajov o rýchlosti v hladine 500 mb.** [Estimating wind velocity at the 300 mb, 200 mb and 100 mb levels and at the tropopause from data on velocity at 500 mb.] *Meteorologické Zprávy*, Prague, 12(5):112–114, **1959.** 3 figs., 2 tables, 3 refs. Czech, Russian and English summary p. 112. **DWB, DLC**—The correlation coefficients between the wind velocities are given for the different levels and a method is proposed for determining the wind velocity in higher levels from wind velocity data in the 500 mb level by means of regression lines. The values given are valid for the south-west synoptical situation. *Subject Headings:* **1. Upper air wind computation 2. Wind speed estimation.**—*Author's abstract.*

VERTICAL MOTION (551.558)

See also: **Convection above fires** (Murgai, Emmons), 12.9–80; **Electronic gust load integrator** (Tevriukov), 12.9–280; **Vertical currents** (Dushkin, Lomonosov), 12.9–302; **Generation of wave energy** (Warren), 12.9–310; **Lee waves in French Alps** (Gerbier), 12.9–348; **Jet stream clouds, Middle East** (Eltantawy), 12.9–376.

12.9–357 551.558.21

Wallington, C. E., **An introduction to lee waves in the atmosphere.** *Weather*, London, (8):269–276, Aug. **1960.** 5 figs., table, 16 refs. **DLC, DWB**—This is a non-mathematical view of the whole subject of lee waves and associated phenomena. It is well illustrated ith clear descriptive diagrams. The lee wavelength and amplitude are defined, vertical rrents and wave cloud are discussed. The main features commonly associated with wave nditions are outlined following papers by PILSBURY and MASON. The relationship between inds, temperatures, lee wavelength and amplitude are briefly mentioned. Discussions are ven of the effect of the shape of hills, rotor flow and turbulent effects and the upwind jump. he article is rewritten from an article which appeared in *Schweizer Aero-Revue*, Berne, 34:187–0, 1959. (*See* 11.1–231, Jan. 1960, *Met. Abs.*) *Subject Heading:* **1. Lee waves.**—*R.B.*

12.9–358 551.558.21:551.43(234.42,438)

Parczewski, Władysław, **O przeplywie powietrza przes wynioslosci terenowe ze szczególnym uwzględnieniem Tatr.** [Air flow over mountains, with particular attention to the atra mountains.] *Poland. Państwowy Instytut Hydrologiczno-Meteorologiczny, Wiadmości łużby*, 6(5):265–270, **1959.** 5 figs., 3 tables, 8 refs. Russian and French summaries p. 270. **WB, DLC**—The author discusses the general atmospheric conditions existing in the Tatra gion of Poland and analyzes in detail the distribution of air currents in the troposphere for able thermal equilibrium. It is found that the air currents have an important influence n the formation of weather conditions in the mountain ranges beneath the currents. Five gures and two tables are included. *Subject Headings:* **1. Air currents and weather conditions Topographic influences 3. Tatra Mountains, Poland.**—*A.L.M.*

AQUEOUS VAPOR AND HYDROMETEORS (551.57)

HUMIDITY (551.571)

See also: **Psychrometric tables** (Rojecki), 12.9–257; **Formula for saturation vapor pressure** (Bosen), 12.9–265; **Tropical storms** (Landsberg), 12.9–319.

12.9–359 551.571.3:551.510.522

Kolesnikova, V. N., **Rezhim vlazhnosti v nizhnem kilometrovom sloe atmosfery v Toi-iube.** [Moisture regime in the lower kilometer layer of the atmosphere at Toi-Tiube.] *redneaziatskiĭ Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 2(17):213–22, **1959.** 3 figs., 7 tables, 9 refs. **DWB** (M(055) U581ts)—The results of observations on he moisture regime in the lower kilometer of the atmosphere over Toi-Tiube (near Tashkent) re presented and analyzed. Data are given on the daily variation of specific and relative umidity at different altitudes; mean values of relative humidity in %; mean value of the pecific humidity (g/kg) during the summer; variation of the specific humidity with altitude or individual months; mean gradient of specific humidity; extreme values of specific humidity ith height during the winter, etc. *Subject Headings:* **1. Humidity variations 2. Toi-Tiube, ashkent.**—*I.L.D.*

12.9–360 551.551.8:551.571.4

Frankenberger, E. (*Deutscher Wetterdienst, Met. Obs., Hamburg, Germany*), **The frequency istribution of vertical diffusion coefficients for vapour at 35 m. height.** *Advances in Geo-hysics*, N. Y., Vol. 6, pub. **1959.** p. 269–271. fig., 2 refs. **DWB, DLC**—The author presents graph showing the frequency distribution of vertical diffusion coefficients for vapor at 35 m.

height above meadows at 53°44′N; 09°53′E (Feb., July, Oct., and 1953–1954). These coefficients have been devised from mean hourly vertical differences of dry and wet bulb temperatures and the mean hourly rates of heat and water vapor transfer at the 35 m. level. The great influence of stable thermal stratification is represented by the high frequency of low coefficients in Oct.; 35% of all mean hourly coefficients were less than 2.5×10^3 cm² sec^{-1}. In these weather situations the variations of K with height is very small. The distribution of May and July is similar to that of June. During Feb. strong forced convection prevailed so that extreme values of the coefficients were rare. *Subject Headings:* **1. Vertical diffusion coefficient 2. Vapor diffusion.**—*I.L.D.*

EVAPORATION AND EVAPOTRANSPIRATION (551.573)

See also: **Radiation, heat and evapotransp. of grass** (Scholte), 12.9–77; **Water balance, Wales** (Howe), 12.9–130; **Water management in Dijon region** (Mériaux), 12.9–414.

12.9–361 551.501.4:551.508.72:551.573

Berlage, H. P. (*Netherlands Met. Inst.*), **Over een betrekking tussen de volgens de methode van Penman berekende verdampingscijfers voor een vrij wateroppervlak en de met Piche-evaporimeters bepaalde verdampingswaarden.** [Relation between the amounts of evaporation computed following the method of Penman and those measured with Piche-evaporimeters.] *Nederlandse Centrale Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek. Commissie voor Hydrologisch Onderzoek, Verslagen en Mededelingen*, No. 4:70–78, **1960.** 2 figs., 4 tables, 2 refs., 9 eqs. English summary p. 70–71. **DWB**—Measurements with Piche-evaporimeters mounted in free air at a height of 30 cm above the ground were made during 1953, 1954 and 1955 at a large number of stations in the Netherlands. These data were complemented by measurements of the same kind made in 1956 and 1957 at de Bilt. The monthly totals are compiled in table 1, together with the corresponding Penman-values. Formula (3) was developed, providing the ratio between the Penman (Pe)- and Piche (Pi)-values. Formula (3) was finally developed into formulas (8) and (9), the first one being applicable to the Piche-evaporimeter mounted in free air and the second one being applicable to the Piche-evaporimeter mounted inside the Stevenson-screen, at the 2 m level. These formulas are discussed regarding their physical significance, applicability and reliability. The impression prevails that they may be useful in very different climates and in night and day conditions. It might be of value if daily Penman-figures could be defined by simple derivation from daily Piche-figures. *Subject Headings:* **1. Evaporation calculations 2. Evaporimeters 3. Netherlands.**—*From author's abstract.*

12.9–362 551.501:551.573

Rijkoort, P. J. (*Netherlands Met. Inst.*), **De onzekerheid in de verdamping van een vrij wateroppervlak berekend volgens de methode van Penman als gevolg van onnauwkeurigheden in de basisgegevens.** [The uncertainty in the evaporation of free water surface computed according to the method of Penman as a consequence of inaccuracies in the basic data.] *Nederlandse Centrale Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek. Commissie voor Hydrologisch Onderzoek, Verslagen en Mededelingen*, No. 4:46–59, **1960.** 6 figs., 5 tables, ref., 7 eqs. English summary p. 46–47. **DWB**—The estimation of potential evaporation (V_p) by means of the calculation of the evaporation from a free water surface (V_o) according to the method of Penman requires knowledge of the basic mean values of temperature t_z, humidity U_z, wind speed u_z, sunshine percentage p and radiation Q_n. Temperature, humidity and wind speed are measured at a height of 2 m. Owing to the inaccuracies of the methods of observation, the basic values t, p, U and u are estimates of unknown true values t^*, p^*, U^* and u^* with standard deviations S_t, S_p, S_U and S_u. The inaccuracy of the radiation values Q_n is ruled out, as this quantity is given a constant value for each month. The subject of this article is the calculation of the total inaccuracy S_{Vo} of the evaporation V_o as a result of the existence of S_t, S_p, S_u and S_U. S_{Vo} is computed with the well known formula (1). *Subject Headings:* **1. Evaporation from water surfaces 2. Penman's method of calculating evaporation**—*Author's abstract.*

12.9–363 551.509.61:551.573

Evaporation control: further information on the application of monolayers for the reduction of evaporation losses from water surfaces. *Water and Water Engineering*, London, 65(781):97–103, March 1961. 6 photos. **DLC**(TA1.W38)—This paper gives a review of recent work carried out by Prices (Bromborough) Ltd. and by the Commonwealth Scientific and Industrial Research Organization in Australia on the use of cetyl alcohol films for reducing water losses by evaporation. Work by Prices has been directed (1) to the determination of the effect of wind on the application and propagation of the film (2) to compare the effects of different solvents and (3) to study known methods of applying the film. Wind was shown to be of considerable importance in determining the minimum effective rate of applying the film over large water surfaces. Work by C. S. I. R. O. has been on the application of a cetyl-stearyl alcohol blend applied as a fine powder from a dispenser mounted in a boat. *Subject Heading:* **Evaporation control.**—*R.B.*

12.9–364 551.582.3:551.573

Kaganer, M. S. and Ogievskaia, V. A., **Karty mesiachnogo isspareniia s vodnoĭ poverkhnosti po territorii Ukrainy.** [Maps of monthly evaporation from a water surface in the Ukraine.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 15:24–36 **1958.** 11 figs., 3 tables, 8 refs., eqs. **DLC**—The author attempted to render more accurate the maps of mean annual evaporation of V. I. Mokliak for the Transcarpathian and Crimean regions by using more recent data and constructing monthly maps of evaporation from a water surface. Long period values of monthly and annual evaporation were determined from long period monthly moisture deficit with the aid of Mokliak's formula $Z = 30d^{0.70}$ and the subsequent correction on the basis of the maps of mean annual evaporation of V. K. Davydov (where Z = evaporation per month in mm, d = atmospheric saturation deficit). A detailed description of the procedure of continuing the maps, data giving the annual and monthly evaporation tables at the Transcarpathian stations, graphs showing the dependence of annual evaporation on May–Oct. evaporation and the dependence of evaporation from evaporimeters based upon evaporimeters in the soil and maps of mean long period evaporation for every month in the period April–Nov. are presented. The variation of evaporation in all maps agrees with the distribution of atmospheric temp. and better still with the moisture deficit, which actually is the basis of the formula used to measure evaporation from a water surface. The maximum evaporation occurs during July–Aug., the minimum during Nov. *Subject Headings:* **1. Evaporation from water surfaces 2. Transcarpathian Region, U.S.S.R. 3. Crimean A.S.S.R.**—*I.L.D.*

12.9–365 551.501:551.573:581.11

†Makkink, G. F. (*Inst. voor Biologisch en Scheikundig Onderzoek van Landbouwgewassen*), **De verdamping uit vegetaties in verband met de formule van Penman.** [Evaporation from vegetation in relation to the formula of Penman.] *Nederlandse Centrale Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek. Commissie voor Hydrologisch Onderzoek, Verslagen en Mededelingen*, No. 4:90–115, **1960.** 19 figs., table, 27 refs., 6 eqs. English summary p. 90. **DWB**—Evaporation from vegetations is discussed, especially from agricultural and hydrological view-points. Causes are mentioned which can make evaporation higher or lower than evaporation from a free water surface (E_0). The potential evapotranspiration from a short grass vegetation without water shortage (E_p) is compared with E_0. Research by the author (1957) with lysimeters is resumed; the empirical formulae found for E_p is (2) and for E_0 is (5). From these it may be concluded that a constant factor 0,65 for E_p/E_0 can be applied. A comparison of E_0 according to Penman or to (5), with the evaporation from a floating pan in the Ijssellake, is not conclusive as for the correctness of the calculation of E_0. The relationships between the actual evapotranspiration from a grass cover (E_r) at one hand, and the moisture tension at −5 cm and the soil type on other hand, are summarized (Makkink and Van Heemst 1956). New observations from the Netherlands are mentioned, proving that for any vegetation x (grass, arable crops or forests) the actual evapotranspiration E_r can be higher than E_p, even equal to E_0. This can be due to advective heat. A more detailed study on vegetation factors is wanted for the relationships between E_{rx} and E_p or E_0. The author recommends E_p as a standard and not E_0, because E_r and E_{rx} physically and biologically relate

to it, thus facilitating the estimation of vegetation factors. *Subject Headings:* **1. Evaporation from vegetation 2. Evapotranspiration 3. Short grass 4. Netherlands.**—*Author's abstract.*

12.9–366 551.501:551.573:581.1

Rijtema, P. E. (*Inst. voor Cultuurtechniek en Waterhuishouding*), **Een onderzoek naar de nauwkeurigheid van verschillende methoden om de potentiële verdamping te bepalen.** [An investigation about the accuracy of different methods for the calculation of the potential evapotranspiration.] *Nederlandse Centrale Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek. Commissie voor Hydrologisch Onderzoek, Verslagen en Mededelingen*, No. 4:79–89, **1960.** 11 figs., 2 tables, 17 refs., eqs. English summary p. 79. **DWB**—A comparison has been made between the calculated values of the potential evapotranspiration after PENMAN (1948, 1956) MAKKINK (1957b), TURC (1954b, 1955) and HAUDE (1952, 1955) and the measured evapotranspiration values from weighable lysimeters covered with grass and from evaporation pans. It appears that the methods have about the same degree of accuracy. The error in the results of the calculations after HAUDE seems to be somewhat higher. A careful handling of the Haude-formula is necessary since the formula of the reduction factor given in this paper is only tested at Wageningen. It is possible to calculate the potential evapotranspiration from meteorological data after PENMAN, MAKKINK and TURC with the same accuracy as is obtainable with lysimeters and evaporation pans. The reduction factor of PENMAN holds true only for the potential evapotranspiration of a short crop. The Turc formula is the only one which offers some possibilities to calculate also the actual evapotranspiration. One may therefore assume that a further progress in this field of science will not result from an increased accuracy of these modern evapotranspiration formulae but from a further study of the influence of environmental conditions on the reduction factor. *Subject Headings:* **1. Potential evapotranspiration 2. Wageningen, Netherlands.**—*Author's abstract.*

12.9–367 551.506:551.573:581.1

Valken, K. F. (*Deltadienst Rijkswaterstaat*), **Het Gebruik von verdampingscijfers.** [The application of data concerning evapotranspiration.] *Nederlandse Centrale Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek. Commissie voor Hydrologisch Onderzoek, Verslagen en Mededelingen*, No. 4:143–149, **1960.** 3 figs., eqs. English summary p. 143. **DWB**—This article deals with the effect of inaccuracies in evapotranspiration data when such data are used to determine the supply of water required for agricultural purposes, or to ascertain the seepage in low lying polder areas. An inaccuracy of 10%, which is relatively small, may easily entail a difference of 20 to 40% in the amount of water to be supplied. The same thing applies to the seepage if determined from the balance between the quantities of water entering and leaving a polder, the evapotranspiration being one of these quantities. Seepage water in the coastal area is very saline and consequently the flushing required to keep the polders and lakes in a reasonable condition calls for large quantities of fresh water. This being scarce at times, it is imperative to have more accurate data available when drawing up comprehensive schemes like the Delta Plan. For this reason, various hydrological tests and measurements concerning the subsoil and subsequent calculations of the seepage are being carried out. The result of these calculations may in turn lead to more satisfactory evapotranspiration figures. *Subject Heading:* **1. Evapotranspiration data accuracies.**—*Author's abstract.*

12.9–368 551.577:551.573:551.579.5:631.6

†van Eyden, W. A. A. (*Deltadienst Rijkswaterstaat*), **Onderzoekingen betreffende de waterbehoefte als functie van de neerslag en de verdamping, alsmede van het verbruik en gebruik van de vochtvoorraad in de bodem.** [Investigations concerning the water requirements as a function of precipitation and evaporation as well as of the consumption and use of water stored in the soil root zone.] *Nederlandse Centrale Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek. Commissie voor Hydrologisch Onderzoek, Verslagen en Mededelingen*, No. 4:176–205, **1960.** 14 figs., 3 tables, 25 refs., 9 eqs. English summary p. 176–177. **DWB**—The supplementary fresh water required during a certain period to meet agricultural needs may be determined from the average precipitation deficiency during that period less the supply the crop may draw from the water storage in the soil root zone. If the average is taken over a long period, the precipitation deficiency will be smaller than an equally frequent deficiency deter-

ained for a shorter space of time, since temporary peak shortages will have a relatively smaller influence in the first case. Consequently, the average requirement for a long period may be less than for a shorter one. To meet peak needs, however, the crops will temporarily draw an extra quantity of water from the root zone storage. This they can only do if the buffer capacity of the storage is sufficiently large. In the Netherlands most types of soil have a capacity which should be amply sufficient to justify a more or less even supply of water based on the average deficiency over one month or an even longer period. For that matter, sluices, conduits, etc., may be designed smaller than is sometimes the case, while the distribution of fresh water may be accomplished more economically. In addition to the buffer function of the subsoil water storage, this storage may also reduce the normal water supply. No comprehensive data concerning the soil moisture content in the various cultivated areas in the Netherlands are available. Nevertheless, it turned out to be feasible to link the consumption of soil moisture by the crops with the main types of soil. With regard to the actual quantity of water stored in the root zone the result was but fictitious, however, since only the part consumed by the crops could be included in the calculations and many other factors should have been taken into account as well. Nevertheless, the introduction of this "apparent water consumption" as it is called, has enabled us to get a broad insight into the general features of water management for agriculture. *Subject Headings:* 1. **Water management** 2. **Precipitation deficiencies** 3. **Netherlands.**—*Author's abstract.*

12.9–369 551.501-551.573

Wesseling, J. (*Instituut voor Cultuurtechniek en Waterhuishouding*), **Hulpmiddelen bij de berekening van de verdamping uit een vrij wateroppervlak.** [Aids to the calculation of the evaporation from a free water surface.] *Nederlandse Centrale Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek. Commissie voor Hydrologisch Onderzoek, Verslagen en Mededelingen*, No. 4:31–45, **1960.** 9 tables, 3 refs., numerous eqs. English summary p. 31. **DWB**—The calculation of the evaporation from a free water surface according to the equation given by PENMAN has been discussed. The data used for the calculation are sunshine duration (n/N), temperature of the air (t_z), relative humidity (U_z) and wind velocity (u_z) all measured at screen level (z) and taken from the Monthly Weather Reviews (Maandoverzichten) of the K.N.M.I. (Roy. Neth. Meteor. Inst.). In order to simplify calculations, MAKKINK (1953) proposed graphs, containing the various relations needed for the calculation. RIJKOORT (1954) developed a nomogram containing the above mentioned climatological data. In order to prevent errors, VAN DUIN (1956) used tables instead of graphs. This method is also followed in this article. The key to the tables is given in the form of a calculation scheme which is given at the end of the article. Following this scheme the calculation required only a relatively short time. *Subject Heading:* **1. Evaporation from water surfaces.**—*Author's abstract.*

CONDENSATION (551.574)

See also: **Atmospheric reactions** (Farlow), 12.9–94; **Glaze storm, S. Ontario** (Thomas), 12.9–288; **Aitken nuclei obs.** (O'Connor et al.), 12.9–300; **Climatic classification by glaze regions, Transcaucasus** (Chirakadze), 12.9–425.

12.9–370 551.574.1:536.421:546.212

Hori, Takeo, **On the supercooling and evaporation of thin water films, Pt. 1.** *Low Temperature Science, Ser. A, Physical Sciences*, 15:34–42, **1956.** Transl. by Charles A. Meyer and Co., Inc. of original Chinese (Romanized: **Mizu no hakumaku no kareikyaku to johatsu, 1**) issued as *U. S. Snow Ice and Permafrost Research Establishment, Translation* No. 62, Feb. **1960.** 8 p. 8 figs., eq. **DLC**—Many experiments have been conducted on the phenomenon of supercooling of water which show that it is very difficult to freeze free water droplets. But they ultimately freeze at −40°C. The author carried out experiments on freezing of thin films of water sandwiched between two glass plates. Fig. 1a and 1b give the details of the apparatus used. When the water is confined by thick plates the temperature lag is 10°C to 15°C. The experiments showed that when thickness of water is 1 mm to 1/100 mm degree of supercooling increases to −30°C and when thickness is below 1/100 mm there is no freezing

even at −90°C. An experiment is also described to determine the vapor pressure. *Subject Heading:* **1. Supercooling of water.**—*A.H.K.*

12.9–371 551.574.42:551.578.45(768)

*Tennessee Valley Authority, **Snow and ice storms of 1959–1960 in Tennessee River Basin: Supplement to Precipitation in Tennessee River Basin, March 1960.** Issued 1960. 71 p. 25 figs. (incl. photos), 9 tables. **DWB** (M06.1/768 T297)—A report on the snow and ice storms of 1959–1960 in Tennessee River Basin. The winter of 1959–60 was the worst on record. An average snowfall of 34.8 inches occurred over the Basin during Nov. 1959–March 1960. A severe ice storm occurred on March 2, 1960. The report is divided into four parts each containing data, photographs and discussion: Seasonal and monthly snowfall for 1959–1960; Snowstorms and their effect on Basin activities; the great ice storm of March 2, 1960 and the coldest March on record in the Tennessee River Basin. Contains maps showing locations of stations, distribution, and pattern of total snowfall. *Subject Headings:* **1. Snowfall data 2. Snowstorms 3. Ice storms 4. Tennessee.**—*E.Z.S.*

FOG (551.575)

12.9–372 551.511.6:551.510.42:551.575.1:629.139(443.611)

Duvergé, P., **Brouillards et fumées sur l'aéroport d'Orly.** [Fogs and smokes on Orly airport.] *France. Secrétariat Général à l'Aviation Civile, Revue*, No. 105:9–31, June 15, 1960. 11 figs., 3 photos, 5 tables, 15 refs.—This very elaborate study of the frequency, distribution and causes of fogs on Orly airport begins with a comparison between the visibility conditions at Orly and Le Bourget. The examination of the distribution of fogs in function of the speed and direction of wind shows two "privileged" sectors, one of about 60° centered on the NNE, the other of 90° centered on the SSE, thus axed on the two directions in which the smoke-producing works nearest the airport are situated. These observations, the relatively high frequency of fogs occurring with strong wind, and the analysis of the fog distribution in function of the wind at Orly on working days on the one hand and during the week-ends on the other show the repercussion of industrial pollution on the visibility at Orly. The author briefly describes Sutton's theory relating to the diffusion of smokes and explains the formula giving the concentration in all points of the atmosphere for a pin-point emission. This formula is applied to two works which play a leading part in polluting the air at Orly. The distribution of fogs expressed in percentages is as follows: fog when wind is calm = 31% of cases, meteorological causes = 29%, influence of the Seine river = 13%, and industrial smokes = 27% (northern sector 7%, and southern sector 20%). Starting from these data, practical results are derived for the better use of Orly airport. *Subject Headings:* **1. Fog distribution 2. Atmospheric pollution effects on fog frequencies 3. Sutton's theory 4. Orly airport, Paris.**—*A.V.*

CLOUDS (551.576)

See also: **Radar investig. of cumulus rainclouds** (Sal'man), 12.9–107.

12.9–373 551.576.1

Oddie, B. C. V., **Some cirrus cloud observations made by the Westminster Shiant Isles Expedition, 1958.** *Weather*, London, 14(6):204–208, June 1959. 2 figs., 1 table, 1 ref. **DWB**—A short series of observations of cirrus clouds yielded examples of the formation in clear air of both cirrus uncinus and cirrocumulus, and of the development of each type from the other. Ludlam's theory of the formation of shred-clouds is tenable. Two unusual phenomena observed were the formation of small cirrocumulus masses at the bottoms of cirrus-streaks, and the separation of a cirrus-streak from its parent cloud. *Subject Heading:* **1. Cirrus cloud observations.**—*E.Z.S.*

12.9–374 551.501.776:551.576.11:551.578.11

Nikandrova, G. T. and Fridman, Iu. S., **K voprosu o metodike opredeleniia kharakteristik raspredeleniia razmerov kapel' v oblakakh.** [Method of determining the characteristics of the

oplet size distribution in clouds.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, o. 102:58–62, **1960.** 2 tables, 7 refs. Russian summary p. 58. **DWB**—The variability of e spectrum of the dimensions of drops in clouds and the determination of what constitutes an dequate number of samples was investigated by mathematical statistical methods applied data on the distribution of drops for Cirrus Congestus and Stratus clouds. Samples were ken characterizing the variability of drop spectra within different clouds of the same type d within given intervals above the cloud base. The variability of the mean dimension of rops for individual samples is given by:

$$V_{\bar{r}} = \frac{\sigma_{\bar{r}}}{\bar{r}} 100\%$$

d the variability of the square deviation:

$$V_{\sigma} = \frac{\sigma_0}{\sigma} 100\%$$

y means of the nomogram of A. K. Mitropol'skii, the author estimated the mean number of mples necessary at different levels of stratus and cirrus and cirrus congestus clouds for =0.95 and $\epsilon = 10\%$. Tables giving the variability of r and σ in cirrus congestus and stratus ouds, the necessary number of samples at different levels and the adequate number of observa- ons for a given variability V and permissible error ϵ are presented. *Subject Headings:* **Droplet size distribution 2. Cloud droplet size distribution.**—*I.L.D.*

12.9–375 551.576.11:536.421

Nikandrova, G. T. and Khimach, M. A., **Kharakteristiki mikrostruktury pereokhlazhdennykh oblakov.** [Characteristics of the microstructure of supercooled clouds.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 102:50–57, **1960.** 5 figs., table, 5 refs., 2 eqs. Russian summary p. 50. **DWB**—In this study of the microphysical properties of supercooled clouds, the authors investigated the water content of clouds, dimensions of cloud drops and the intensity of icing within clouds on the basis of data obtained during experimental airplane flights. The intensity of ice deposition served as a basis for determining the characteristics of the zones of icing within clouds. The intensity of icing in Sc, St, and Ns clouds increased with height and reached a maximum in the upper half of the layer but at the upper boundary it diminished. At the same time, in Ns clouds, the maximum intensity of icing was encountered not in the upper half but in the middle and even in the lower portion where supercooled drops predominated. In such clouds, the upper part was often purely crystalline. The zones of maximum icing coincided with those of maximum water content and were situated in the upper part of supercooled clouds. The water content characteristics of supercooled clouds of any type especially Sc, St, Ns, Ac and As clouds were as follows: mean value of water content was .195 g/m³. The mean water content differed little in the different cloud types: the maximum water content was 0.22 g/m³ in Sc clouds and the minimum 0.20 g/m³ in St and Ns clouds and 0.12 g/m³ in As clouds, etc. The amount of condensing water vapor within clouds depends upon the temperature at the level of the cloud base and the water vapor diminishes as the temperature of the cloud base diminishes. The modal radius of drops in clouds of different type was found to have values between 2 and 15μ and the maximum probable value was 5–6μ. In most spectra (in 90%) the radius did not exceed 10μ. The median radius of drops according to water content may have values up to 30μ since its maximum probable values are from 8 to 12μ; in 50% of the cases it does not exceed 10μ and in 90%–20μ. *Subject Headings:* **1. Supercooled clouds 2. Icing in clouds.**—*I.L.D.*

12.9–376 551.513.2:551.557.5:551.576.12

Eltantawy, A. I. (*Cairo Univ. Giza, Cairo*), **Jet stream clouds in the Middle East.** *Geofisica Pura e Applicata*, Milan, 46:352–359, May/Aug. **1960.** 2 figs., table, 18 refs. English summary p. 352. **DWB, DLC**—A time cross-section was constructed for Cairo during the period 0–31 Dec. 57. The outstanding feature of this cross-section is the periodic existence of high wind maxima associated with high cloud formation. A method was suggested for the location of high wind centers from the thermal field only. Moreover, the climatological means of high clouds showed quick changes in the period of the Jet Stream migration. This has been taken

as an evidence of the relation between the subtropical Jet Stream and high cloud formation in the region. *Subject Headings:* **1. Jet stream clouds 2. High cloud formation 3. Subtropical jet stream 4. Cairo, Egypt.**—*Author's abstract.*

12.9–377 551.576.32(47

*Elliott, F. E., **Mean monthly cloud cover over the U.S.S.R.,** *General Electric Advanced Electronics Center, Cornell University, Ithaca, N. Y., Technical Information Series,* No. R60ELC31, March **1960.** 98 p. 10 charts, map, ref. Almost entirely tables. **DWB** (M76.2 E46m4)—Tabulated monthly station data are presented, including the number, name, years of record, geographical coordinates and mean monthly cloud cover expressed in percentage of sky covered. Mean monthly overlay maps representing the amount of clouds in tenths of sky cover can be used on the concident base map attached at the rear of the report. Areas of lowest and highest cloud cover for the year are also shown on the maps. The period of records varies from 2 to 50 years. Stations covering rather short periods were used by omitting them for months which fell outside the pattern of long-period stations, and including them if they fell within the pattern. *Subject Headings:* **1. Cloud cover maps 2. Mean monthly cloud cover 3. U.S.S.R.**—*O.T.*

12.9–378 551.576.4:551.510.52

Menmuir, P., **Observation of cumulonimbus top extending into the stratosphere.** *Meteorological Magazine,* London, 89(1051):56, Feb. **1960.** photo (opp. p. 50). **DWB, DLC**—On Aug. 10, 1959 within an area of active thunderstorms over north-east Belgium the top of a cloud was observed at a true altitude of 42,500 ft. A photograph of the cloud is reproduced. The synoptic situation is described as showing a slow moving depression over north-east Belgium with troughs south-east wards to Switzerland and west-wards to the Bristol Channel. *Subject Headings:* **1. Cumulonimbus heights 2. Synoptic situations 3. Northeast Belgium**—*I.S.*

12.9–379 551.576.4(213

Ryan, P. (*Met. Office, Aerodrome, Darwin*), **Height of cirrus cloud tops in tropics.** *Australian Meteorological Magazine,* Melbourne, No. 25:76–77, June **1959. DWB**—The highest tops observed were 54,000 ft. In the tropics, especially in the Intertropic convergence zone layer cloud to above 50,000 ft is not uncommon. It is difficult to see where the moisture comes from to maintain continuous layer clouds up to 50,000 ft. *Subject Headings:* **1. Cirrus cloud 2. Cloud heights 3. Tropics.**—*E.Z.S.*

PRECIPITATION (551.577)

See also: **Tungsten-185 in precip.** (Walton), 12.9–100; **Max. runoff, Georgian SSR** (Murvanidze), 12.9–127; **Water balance, Wales** (Howe), 12.9–130; **Water requirements for soil root zone** (van Eyden), 12.9–368; **Water management in Dijon Region** (Mériaux), 12.9–414; **Soil water balance** (Turc), 12.9–415.

12.9–380 551.501.81:551.577.

Malkowski, G. (*Inst. of Met. & Geophysics, Freien Univ., Berlin*), **Zur Schauerlage vom 10. September 1958.** [Shower conditions on Sept. 10, 1958.] *Meteorologische Rundschau,* Berlin, 12(5):153–158, Sept./Oct. **1959.** 16 figs., ref. German summary p. 153. **DWB, DLC**—Radar photographs taken in Berlin during the shower are evaluated and their results are discussed. The limitations of information available from them are indicated. *Subject Headings:* **1. Radar photographs of showers 2. Berlin, Germany.**—*E.Z.S.*

12.9–381 551.577.

Woodcock, A. H. (*Woods Hole Oceanog. Inst.*), **The origin of trade-wind orographic shower rains.** *Tellus,* Stockholm, 12(3):315–326, Aug. **1960.** 9 figs., 3 tables, 18 refs., ed **DWB**—The purpose of the work reported here was to learn more about rain formation through a study of the extensive Project Shower and other data on the physics and the chemistry of rains. Most of the observations used have been published. It is demonstrated that the water and chloride content of orographic shower rains in Hawaii can be roughly computed from th

bserved amounts of sea-salt aerosols and water vapor in the sub-cloud layer over the sea, suming wet adiabatic ascent of the air. From this and several other relationships among e properties of the air and rains, it is tentatively concluded that the showers originate within pecially moist parcels of air which are carried into the orographic cloud by the trade winds, d which were previously formed in the sub-cloud layer over the windward sea. Specific ggestions are made for testing the degree to which potential shower-forming air may be entified over the sea or the windward shore prior to rain formation. *Subject Headings:* **1. Rain formation 2. Trade winds 3. Orographic effects.**—*Author's abstract.*

12.9–382 551.577.2:551.42(285:774)

Blust, F. and DeCooke, B. G. (*both, U. S. Lake Survey, Detroit, Mich.*), **Comparison of precipitation on islands of Lake Michigan with precipitation on the perimeter of the Lake.** *Journal of Geophysical Research*, Wash., D. C., 65(5):1565–1572, May **1960.** 5 figs., 3 tables, refs. **DLC**—A program for measurement of precipitation on certain islands in northeastern ake Michigan and on the lake's perimeter is described, and an analysis is made of the data ollected to date. The analysis indicates that lake surface precipitation computed from the erimeter stations may be greater than the true amount in summer and less in winter. The xposure of the individual precipitation gages on islands is a major factor in the analysis of the ata. *Subject Headings:* **1. Precipitation over lakes 2. Rain gage exposures 3. Precipitation ata analysis 4. Lake Michigan, U. S.**—*Authors' abstract.*

12.9–383 551.577.2(410)

Grindley, J. (*Met. Office, Great Britain*), **Rainfall over Great Britain and Northern Ireland uring 1960.** *Water and Water Engineering*, London, 65(781):120–123, March **1961.** map, tables. **DLC** (TA1.W38)—The main features of the rainfall distribution are described. he months July to Nov. 1960 were wettest on record and the calendar year as a whole was the hird wettest. *Subject Headings:* **1. Rainfall distribution 2. Great Britain.**—*R.B.*

12.9–384 551.582.3:551.577.2(414.2)

Johnston, T. and Holmes, J., **The preparation of local rainfall maps.** *Meteorological Magazine*, London, 89(1056):190–194, July **1960.** 4 figs., table, ref. **DWB, DLC**—This note escribes the preparation of a set of local comparative rainfall maps for the county of Ayrshire. hey are intended for use by local forecasters at Prestwick. Ten synoptic situations in 1956 ere used to prepare the maps. Given a synoptic situation the forecaster can have recourse o the maps for a comparable type. *Subject Headings:* **1. Rainfall maps 2. Local synoptic tudies 3. Prestwick, Scotland.**—*E.Z.S.*

12.9–385 551.506.3:551.577.2/3(234.42,438)

*†Karasiński, Tadeusz, **Opady atmosferyczne w Tatrach.** [Precipitation in the Tatra ountains.] *Poland. Państwowy Instytut Hydrologiczno-Meteorologiczny, Wiadomości Służby*, (5):223–238, **1959.** 6 figs., 8 tables, 24 refs. Russian and French summaries p. 238. **DWB, DLC**—Eleven meteorological stations contributed data to make this study of precipitation n the Tatra Mountains of Poland. The data covered 1891–1951. Precipitation increases in direct proportion to altitude up to 1700 m, still below the summits. At 1700 m the total nnual rainfall exceeds 1600 mm. Above this, the increase is slight and between 1800 m and 1900 m the inversion zone appears. The Western Tatras have greater accumulation than the Eastern Tatras. *Subject Headings:* **1. Precipitation distribution 2. Tatra Mountain, Poland.** —*A.L.M.*

12.9–386 551.577.21(458.2) 551.577.3

*Bulmer, B. F. and Stornmouth, K., **The rainfall of Malta.** *Great Britain. Meteorological Office, Scientific Paper* No. 3, **1960.** 20 p. 14 figs., table, 4 refs. **DLC**—Rainfall records have been maintained in Malta for over 100 yrs. All available records have been studied in this report and mean monthly rainfall figures are tabulated month by month for 1854–1953. The geographical distribution over the Islands both of Malta and Gozo is discussed as is also the diurnal and annual variations and the topographical effects. The rainfall of Malta is subject to violent and apparently random annual variations but despite this no appreciable secular change is noted. It is thought that conclusions reached in this paper regarding the balance

achieved between the diurnal and convective cycles and the role of sea-breezes will have ap plications to the many other islands of such size that neither the marine cycle nor the land cycl is wholly dominant. *Subject Headings:* **1. Island rainfall 2. Rainfall data analysis 3. Malta** —*R.B.*

12.9–387 551.577.32:523.74

*†Baur, Franz (*Frankfurt Univ.*), **Die Sommerniederschläge Mitteleuropas in den letzen 1 Jahrhunderten und ihre Beziehungen zum Sonnenfleckenzyklus.** [Summer rainfall of centra Europe in the last 150 years and its relation to the sunspot cycle.] Leipzig, Geest & Portig **1959.** 79 p. 2 figs., 19 tables., 20 refs. **DWB** (M78.1 B351so)—Calculations based on data gathered from various sources indicate some weather variations coincide with sun spot activity But they are of such short duration that at least in the temperate and polar zones of the earth there can be no question of the existence of a noteworthy eleven year weather cycle coinciden with sunspot activities. Using data from 10 stations during 1804–1956 and 26 stations 1901– 1956 he considers regional and local variations and concludes that movements of particula air masses adequately explain most variations. *Subject Headings:* **1. Summer precipitation 2. Sunspot effects on precipitation 3. Central Europe.**—*E.Z.S.*

12.9–388 551.577.32:551.588.1/2(497.1

Vujević, P. (*Inst. of Geog. Belgrade Academy*), **La différence entre les précipitations en été et en automne considérée en tant que moyen d'appréciation de leur nature maritime ou continentale.** [Difference between precipitation in summer and in fall, considered as a mean of evaluating their maritime or continental nature.] *Bulletin Scientifique*, Zagreb, 2(3):86–88 Nov. **1955.**—Based on the results of the investigations of HENZE, HELLMANN and DIECKMANN on the difference of the precipitation maxima in summer and autumn dependent on maritime and continental influence, their application for Yugoslavia showed irregularities caused by the mountain-range emerging immediately at the coast. A method to achieve the precipitation differences in promilles of the annual height of precipitations will show that they represent the basic cause of the real differences from the coast toward the interior. The data of 203 stations mapped on an isoline chart show 25‰ conclusions corresponding with the results of HENZE and DIECKMANN. *Subject Headings:* **1. Summer precipitation 2. Coastal climates 3. Topographic influences 4. Yugoslavia.**—*O.T.*

12.9–389 551.577.36/7(26.05

*U. S. Weather Bureau, **Rainfall intensity-frequency regime, Pt. 4, Northeastern United States.** Its *Technical Paper*, No. 29, Pt. 4, May **1959.** maps, tables, 16 refs. **Pt. 5, Great Lakes Region.** *Ibid.*, No. 29, Pt. 5, Feb. **1960.** 31 p. numerous figs. (some fold.) and tables **DWB** (M(055) U587t)—These reports contain an analysis of—and the application of rainfall intensity-duration-area-frequency regime, with other storm characteristics, for durations of 20 min to 24 hrs, area from point to 400 sq. miles, frequencies for return periods from 1 to 100 years, for the region between long. 80° and 90°W and north of lat. 40°N, Northeastern United States and the Great Lakes region. *Subject Headings:* **1. Rainfall intensity-duration frequencies 2. Great Lakes region, United States.**—*E.Z.S.*

12.9–390 551.501.777:551.577.51(438

Chomicz, Kazimerz, **Opady w Zakopanem.** [Precipitation in Zakopane.] *Poland Pánstwowy Instytut Hydrologiczno-Meteorologiczny, Wiadomości Służby*, 6(5):207–215, **1959** 7 figs., 10 tables, eqs. Russian and French summaries p. 215. **DWB, DLC**—The formula for the relationship between the altitude of heavier precipitation and its duration is used in a study to determine parametric values in Tatra, Poland. The information used was recorded in Zakopane, Poland from 1930–1944 and part of 1945–1950. Many graphs and tables are included. The author states that the formulas and values are only tentative since they were derived from observations covering a short span of time. *Subject Headings:* **1. Precipitation data 2. Zakopane, Poland.**—*From author's abstract.*—*A.L.M.*

12.9–391 551.508.77 551.577.37(944

Moss, J. M. (*Bureau of Met., Sydney*), **Report on heavy rainfall in the Dorrigo area, New South Wales, Jan. 1959.** *Australian Meteorological Magazine*, Melbourne, No. 25:78–80

ne 1959. tables. **DWB**—A comparison of data from pluviograph and rain gauges at veral stations indicates that a serious underestimation of heavy rainfall is taking place. ain gauges overflow lowering the total of daily rainfall. *Subject Headings:* **1. Heavy rainfall easurements 2. Dorrigo area, New South Wales, Australia.**—*E.Z.S.*

12.9–392 551.577.37(764)

*U. S. Weather Bureau, **Maximum station precipitation for 1, 2, 3, 6, 12 and 24 hours, . 24, Texas.** Its *Technical Paper*, No. 15, Pt. 22, 1959. 210 p. 6 figs., 3 tables, 2 refs. most entirely tables. **DWB**—Tables give monthly values for periods of varying length, ginning in 1940 and ending usually in 1950, of max. 1, 2, 3, 6, 12 and 24 hour precip. amounts d dates thereof. First order station records, however are for entire period (fifty years or ore). *Subject Headings:* **1. Maximum rainfall curves 2. Texas.**—*M.R.*

12.9–393 551.577.38(44)

Geslin, H.; Bouchet, R. J. and Hallaire, M., **A propos de la sécheresse de 1959 et de ses nséquences sur les réserves en eau des vergers au printemps 1960.** [About the drought 1959 and its consequences on the water reserves of orchards in spring 1960.] *Académie Agriculture de France, Paris, Comptes Rendus*, 46(8):463–465, April 27, 1960. fig. **DLC**— Oct. 1959, the water deficit of soil in certain regions of France was important and reached 0 mm in the orchards in the Northern half of the country. Hydrous profiles made in April 60 in the same orchards indicate that the water reserve of the soil remains an important estion. A graph reproduces 3 profiles corresponding respectively to the retention capacity, e maximum drying up observed in Oct. 1959 and the re-moistening profile determined in pril 1960. These profiles show that the winter rains have probably been insufficient for uit cultivation to bring back the moisture to the field capacity on the whole of the profile epth. During summer 1960, the drying up of the upper layers re-moistened through the inter rains will probably be faster. It is then possible, even if the rainfall during the coming onths is normal, that in particular cases the soil attains already at mid-summer, the same ate of dryness. *Subject Headings:* **1. Drought, France (1959) 2. Drought damage Drought effects on the soil water reserves.**—*A.V.*

12.9–394 551.577.38:63(783)

*Pengra, Ray F. (*Assist. Economist, Experiment Station*), **Agricultural drought in South akota: how many droughty days per season?** *South Dakota. Agricultural Experiment tation, Brookings, Agricultural Economics Pamphlet*, No. 94, July **1958.** 43 p. 30 figs., tables, 4 refs. **DWB** (M:63 S726a)—Over 30 charts describe the full grain, the small grain, nd the corn season probable number of drought days at various towns in South Dakota uring 1901–1956. It defines "drought," and presents evaluations of the charts, as well as an ppendix on how the 602A IBM machine was used in the present analysis. *Subject Headings:* **Agricultural meteorology 2. Drought days 3. South Dakota, United States.**—*N.N.*

12.9–395 551.577.38:632.112:633.61

Swan, A. D., **The years of reputed drought.** *Revue Agricole et Sucrière de l'Ile Maurice, ort-Louis*, 39(3):151–154, May/June **1960. DA**—The author mentions the various dry ears which occurred from 1877 to 1937. During these dry years, sugar-cane crop showed a eficit. It is stated that for Mauritius Island the drought intensity for a given year can be xpressed by the deficit of sugar-cane yield. *Subject Headings:* **1. Drought periods 2. Drought atistics 3. Drought effects on sugar-cane production 4. Mauritius Island.**—*A.V.*

RAIN, SNOW AND HAIL (551.578)

See also: **Determining mean data in climat. series** (Jovičić), 12.9–259; **Snow and ice storms 1959–60** (Tennessee Valley Authority), 12.9–371; **Drop size distribution measurement** (Nikandrova, Fridman), 12.9–374; **Electricity in rain** (Ogawa), 12.9–435.

12.9–396 551.578.1:536.421:551.524.36

Volevakha, N. M., **K voprosu o povtoriaemosti zhidkikh osadkov pri otritsatel'nykh emperaturakh vozdukha u poverkhnosti zemli.** [Frequency of liquid precipitation during

negative temperatures at the earth surface.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 8:145–149, **1957.** 2 figs., 2 refs. **DLC** (Slavic)—The monthly frequency of liquid (supercooled) precipitation in the Ukraine is examined, and maps showing the mean number of days with liquid precipitation during temperatures less than 0°C, and mean number of days with liquid precipitation during temperatures of 0° to −3°C at the earth's surface and a table giving the frequency of days with liquid precipitation as a function of air temperature at the earth's surface in different physiographic zones of the Ukraine are presented. The most frequent occurrence of liquid precipitation during negative air temperature at the earth's surface was observed in the central and eastern regions of the Ukraine (on the average of 14–16 days). Supercooled precipitation (rain, drizzle) occurred in most cases (more than 80%) at air temperature of 0 to −3°C at the surface of the earth. Minimum temperatures at which drizzle fell in the Ukraine lay between −12 and −14°C. In the Carpathian and Crimean Mountains the frequency of the number of days with liquid precipitation during negative air temperatures at the surface of the earth was reduced especially at temperatures less than −3°C. *Subject Headings:* **1. Liquid precipitation frequency 2. Supercooled precipitation 3. Ukrainian S.S.R. 4. Carpathian Mts., S.S.R. 5. Crimean Mts., S.S.R.**—*I.L.D.*

12.9–397 551.513:551.578.13:551.578.42

Whittow, John B. (*Makerere College, Univ. College of East Africa, Kampala, Uganda*) **Some observations on the snowfall of Ruwenzori.** *Journal of Glaciology*, London, 3(28):765–772, Oct. **1960.** 8 figs., 5 refs. **DWB, DLC**—The seasonal precipitation of Ruwenzori is examined and the height of the climatic snowline determined. Two distinct periods of surplus accumulation and two ablation seasons can be recognized and give rise to a somewhat complex stratification. Precipitation diminishes with altitude above about 10,000 ft (3050 m). The water equivalent of the annual accumulation on the highest peak is thought to lie between 25 and 20 in. (635–762 mm). Twelve months' synoptic charts have been analyzed and an attempt is made to relate the seasonal variations of accumulation and ablation to the meteorological factors accompanying the oscillations of the Inter-Tropical Convergence Zone. *Subject Headings:* **1. Seasonal precipitation variations 2. Intertropical convergence zone 3. Snow line 4. Altitude effects on precipitation 5. Ruwenzori, Africa.**—*Author's abstract.*

12.9–398 551.578.4:551.524.37(529)

Hwang, K. P., **Snow and frost in Taiwan.** *Meteorological Bulletin*, Taipei, Formosa, 2(4):17–18, Dec. **1956.** fig., 3 tables. In Chinese. **DLC** (Orientalia)—For the purpose of statistical calculation of snowfall in the Yushan area, which is located at 23°29′N, 120°57′E with altitude of 3850 ft in the middle of Taiwan, the causes of snowfall and the monthly mean days of snowfall were tabulated during 1944–1952. The characteristics, such as the boundary line between snow and frost at 24°N, of frostfall which begins generally on Oct. 24 and comes to an end on April 21, were described for the growth of potatoes and of paddy-rice, according to orographic and climatic factors. Statistical duration of frost in various areas from 1897 to 1929 and mean days in a month from 1897 to 1953 were shown in tables as well as distribution of non-frost area shown in a figure. *Subject Headings:* **1. Snowfall formation 2. Frost frequencies 3. Formosa.**—*K.C.*

12.9–399 551.578.4(73

Ludlum, David M., **Some noteworthy snows of 1958–59.** *Weatherwise*, Boston, 13(1):26–29; 39–40, Feb. **1960.** 2 figs. **DWB**—Snowfall amounts and depths of snowcover are cited for noteworthy snows in New England, New York State, the Great Lakes region, the Carolinas, the Rockies, and the Pacific states. New England had below normal snowfall totals, with only one substantial storm, on March 12. Meanwhile, the heaviest snowfalls in several decades were recorded in other parts of the country, notably in the Carolinas, and at lee shore locations in the Great Lakes region. Snowfall totals in excess of 100 in. are cited for many locations in the Lakes area and at mountain locations of the West. *Subject Heading:* **1. Snowfalls U. S. 1958–1959.**—*R. S. Quiroz.*

12.9–400 551.578.41(99)

Picciotto, E.; de Maere, X.; (*both, Expédition Antarctique Belge*, 1958) and Friedman, I. (*U. S. Geological Survey*), **Isotopic composition and temperature of formation of Antarctic snows.** *Nature*, London, 187(4740):857–859, Sept. 3, **1960. DWB**—Variations in the isotopic composition of the oxygen in falls of snow collected during 1958 at King Baudouin Base, 70° S, 24°19′E were given in an earlier paper. This paper presents the analogous variations in the hydrogen contained in the same samples. The aerological radio soundings are analyzed to estimate the temperature range in the cloud corresponding to each snowfall. The ratios oxygen-18:oxygen-16 and deuterium:hydrogen are shown to depend directly on the temperature of formation of snow in the cloud. A variation of 1°C corresponds to a relative variation of about 1% in the ratio oxygen-18:oxygen-16 and 0.8% in the ratio deuterium:hydrogen. *Subject Headings:* **1. Snow composition 2. Isotope content of snow 3. Antarctica.**—*R.B.*

12.9–401 551.578.45:551.311.21:631.4

Matsuzaki, Koichi, **Landcreep at heavy snow districts.** *Studies in Fallen Snow*, Nagaoka, Japan, 4:59–66, **1952.** 4 figs., 4 tables, eqs. **DLC** (Orientalia)—A discussion of soil creep in areas with heavy snowfall. The geological, hydrological, and meteorological factors which are involved in accelerated weathering, soil erosion, and creep under snow cover during certain seasons are described. A chemical analysis of "underground water" is related to weathering and weathering depths. It is suggested that a study of underground meteorology might be a contribution to a better understanding of soil creep. *Subject Headings:* **1. Soil creep 2. Soliduction 3. Weathering 4. Micrometeorology.**—*E.Z.S.*

12.9–402 551.501.9:551.578.46

Garavel, L. and Poggi, A., **Installation d'un laboratoire pour l'étude de la neige.** [Setting up of a laboratory for the study of snow.] *Revue Forestière Française*, Nancy, No. 5:329–331, May **1960.** photo.—The Center of Nivo-glaciological Study and Documentation at Grenoble in collaboration with the French National Weather Service has recently built a laboratory for the study of snow at the Porte Pass, 20 kms from Grenoble. It gives a short description of the buildings and equipment. The equipment permits the permanent measurement and recording of the fusion water from snow outside and in forests; the water content of the snow cover (γ radiation automatic nivometer); the solid and liquid precipitations; the global, diffused and reflected radiations; the air humidity at 30, 100 and 200 cm above the snow surface; the temperature at 12 levels, from 40 cm depth in the soil to 2 m above the snow surface. The equipment will shortly be completed by the installation of electromagnetic hot-wire anemometers enabling the measurement of the wind speeds at different levels above the snow cover. *Subject Headings:* **1. Meteorological stations 2. Snow melt research 3. Snow microclimatology 4. Porte Pass, Isère, France.**—*A.V.*

12.9–403 551.578.46:551.437

Uryvaev, P. A., **Raspredelenie i skhod snega na vodosborakh rek iuzhnoĭ chasti Primorskogo kraia.** [Distribution and disappearance of snow in the river basins of the southern part of the Maritime Territory.] *Dal'nevostochnyĭ Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 8:73–84, **1959.** 5 figs., 3 tables, 2 refs., 5 eqs. **DWB**—The distribution and disappearance of the snow cover has been studied since 1957 at the Primor'e runoff station in the basin of the Suputnika River in order to be able to forecast spring floods and to compute their hydrographs. The topography, the shape and the nature of the slopes and vegetation at various snow measuring lines of the Suputnika River basin are described. The method for proceeding from snow surveys in mountains, where areas of equal size but of different slope differ in the amount of their snow deposits, to the determination of the water content of the snow is described and formulas for calculating the snow deposit on a slope with a given angle are developed. In the mountainous region of Primor'e the uneven distribution of snow on open slopes and slopes covered by a leafy forest is associated with the inclination of the slopes, magnitude of snow melt and the amount of evaporation. The snow deposits upon slopes differ substantially from those on horizontal areas. This difference is particularly

great during spring snow melt. There exists a relationship between the snow deposits upo slopes and on horizontal areas. A comparison between the snow deposits computed by th formula taking into account slope angle and by means of the usual method shows that th results obtained by the formula are much closer to the actual. An analysis of the disappearanc of snow and area of remaining thawed areas for the Suputnika basin and Valdai region shows tha for regions similar in relief, forest cover and climate the curves of the relationship betwee thawing of snow deposits and thawed areas are an invariable property for all catchment basin in similar geographical regions. *Subject Headings:* **1. Snow cover variations 2. River basi hydrology 3. Maritime Territory, U.S.S.R.**—*I.L.D.*

12.9–404 551.578.4

Vanni, Manfredo, **Ricerche sul manto nevoso nell'alta Valtournanche (bacino del Breui 1954–55 e 1955–56).** [Research on snow cover in Alta Valtournanche, Breuil Basin, 1954 1955 and 1955/1956.] *Comitato Glaciologico Italiano, Turin, Bollettino,* Ser. 2, 7(2), 195 issued **1959.** p. 91–130. 4 figs., 8 tables. **DLC**—Extensive data and discussion of the snow regime at the station Lago Guillet (2526 m) and two subsidiary stations of Cîme Blanch (2875 m) and Perrères (1850 m), for 1954–1955 and 1955–1956. Data are presented on th duration of snow, on the density, weight, depth and temperature of snow during individua months, monthly snowfall at individual stations, etc. *Subject Headings:* **1. Snow cover dat 2. Italy.**—*I.L.D.*

12.9–405 551.578.462(237.2

Havens, James M. (*Dartmouth College, Hanover, N. H.*), **An historical survey of the late season snow-bed in Tuckerman Ravine, Mount Washington, U. S. A.** *Journal of Glaciology* London, 3(28):715–723, Oct. **1960.** 4 figs., 34 refs. **DWB, DLC**—As a result of an historica sketch of scientific activity on Mount Washington, New Hampshire, it is shown that the late season snow-bed that annually forms in Tuckerman Ravine disappeared, on the average during the first week in August for 1922–58 as compared with an average date of 11 Aug. fo 1878–1906. This appears to correspond to a rise in spring (April to May) and summer (Jun to Sept.) mean temperatures of 0.9°F (0.5°C) for each season from 1872–87 to 1933–58. Th snow-bed probably has persisted through only one ablation season during recent years, tha of 1926, although some evidence exists that it may have lasted through an occasional summe during the early and middle nineteenth century. *Subject Headings:* **1. Snow cover ablatio 2. Mount Washington, New Hampshire.**—*Author's abstract.*

12.9–406 551.578.8:551.578.71(853

Olazo O., Luis, **Un extraño fenómeno meteorológico en Inquilpata (Cuzco).** [Rar meteorological phenomenon in Inquilpata, Cuzco.] *Revista Meteorológica del Peru,* Lima 5(9):12–15, June **1960. DWB**—A phenomenon never before recorded occurred in Inquilpata in the Dept. of Cuzco, Peru, on Sept. 10, 1959. Normal hail was followed by blue and re colored hail. After citing examples of colored rain (e.g., in areas of quantities of coniferou pollen the precipitation has a yellowish hue, or in ferruginous dust areas precipitation is red) the author suggests that the colored hail was probably due to dust raised during the levelin of some nearby mountains a few days before. *Subject Headings:* **1. Colored hail 2. Cuzco Peru.**—*A.L.M.*

HYDROMETEOROLOGY (551.579)

See also: **Portland cement weathering tests** (Legg), 12.9–86; **Hygrophotography** (Sivadjian), 12.9–281; **Freezing and thawing of peat soil** (Maslov), 12.9–346; **Water requirement for soil root zone** (van Eyden), 12.9–368. *Also see:* **Hydrology Section,** 12.9–119 to 12.9–131.

12.9–407 551.579:631.6

Darves-Bornoz, R., **Une solution nouvelle à l'irrigation des zones de collines: les petite retenues de digue en terre.** [A new solution to irrigation of hill-countries: small impounding

earthen dikes.] *France. Ministère de l'Agriculture, Bulletin Technique d'Information*, No. 0):259–270, **1959.** 7 figs., 10 refs. **DA, DLC**—Settling of small artificial dams, 30,000 to 0,000 m3, impounding the running water behind a earthen dike 7 to 15 m high, offers great vantages in hill-countries. In order to describe the various types of water-reserves, the thor surveys the possibility of preliminary studies to be done. Hydrological balance of the tchment basin must be investigated for precipitation, peculiarities of catchment basin, efficient of run-off, etc. A graph shows the yearly deficit of run-off with regard to annual ecipitation and annual temperature, and consequently the volumes of running waters (diff- ence between the volumes of water fallen and the deficit of run-off, in concordant units). ie technique used in order to realize the dike is indicated, and volumes of water required irrigation and rentability of the system are investigated. *Subject Headings:* **1. Irrigation Hydrological balance 3. Hill country 4. Earthen dikes.**—*A.V.*

12.9–408 551.579:551.43

Uryvaev, P. A., **O sklonovom stoke dozhdevykh vod v Primorskom Krae.** [Slope runoff rainwater in the Maritime Territory.] *Dal'nevostochnyĭ Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 8:64–68, **1959.** fig., 2 tables, ref. **DWB**—In connection th the problem of accurately forecasting summer-fall floods in the Primor'e Territory, the thor investigated the role of rain water runoff on slopes in the general process of flood forma- on. During the summer of 1957 observations on the runoff of rain waters along slopes in the sin of the Suifun River, in the southern part of Primor'e Territory (8 km from Ussuri) ere carried out on runoff on slopes characteristic of a large part of the aforementioned river sin. The soil horizons of the runoff plots are described. The soil moisture content at fferent levels is given; and the rainfall variation on individual days during extensive rainfall presented. It was found that even during extremely intense rainfall (about 90 mm in 3 days) ere was practically no surface runoff on fallow and cultivated slopes of Southern Primor'e nere extensive floods are recorded if the slopes were sufficiently dry before the rain. During e rains discussed in this article large concentrations of water which accumulated on the rface and then flowed into the channel were observed in swampy depressions adjoining the hannels; these depressions are dry during the dry season. This water probably has an portant role in the formation of rain flood in the catchment areas of lowland rivers and reams of Southern Primor'e. *Subject Headings:* **1. Slope runoff 2. Rainfall runoff 3. Mari- me Territory, U.S.S.R.**—*I.L.D.*

12.9–409 551.579.1:628.1(411)

Gorrie, R. M., **Survey of Scottish water resources.** *Water and Water Engineering*, ondon, 65(781):104–109, March **1961.** fig., table, 10 refs. **DLC** (TA1 W38)—Water re- ources are assessed for their share in the locating of old industries and in their effect upon (a) ie current demands for industrial development, (b) the needs of hydroelectric power, and r) future developments in industry and agriculture. The damaging effects of floods and nadir ows can be mitigated by reservoir storage. Scotland has little resource in underground ater supplies. The special character of Highland streams is indicated by their rainfall-run-off atios differing radically from those of English rivers. A strong criticism is raised that there re great gaps in our knowledge of mountain rainfall, and that only a small number of Scottish reams are gaged for stream-flow; these gaps lead to deficiencies in the published *Surface Water Year Book.* More fundamental river behavior studies are needed. The loss to Scotland hrough the removal of Captain W. N. MacClean's records of stream-flow (1912–1940) to the mperial College, London, is pointed out and their return is called for. The Spey Drainage eport of 1951–54 should be published. There is need for a water map or brochure to be ublished summarizing Scots water resources for issue to enquiring industrialists. The run-off rom peat needs close study in view of the wide-spread erosion from burnt moorland; this nquiry should be handled as part of a long-term research project to assess forest and moorland nfluences on river flow specifically for Scottish conditions. This should also cover the con- ribution of snow to runoff and the erosive effect of frost at high altitudes, as well as the effect f recent changes in land use such as deep sheep drains and afforestation furrows. Administra- ion and research need a state-supported organization to deal with Water Surveys or Water

Resources in all aspects. *Subject Headings:* **1. Water supply 2. River catchment rainfall 3. Scotland.**—*Author's abstract.*

12.9–410 551.579.4:551.436(477,479,58)

Ermakov, A. V., **Selevye potoki i mery bor'by s nimi.** [Diluvial mud flows in mountain valleys, and protective measures against them.] *Priroda*, Moscow, No. 12:94–98, Dec. 1959. 4 figs., 4 foot-refs. **DLC**—Mud flows are observed in the mountains of the Major and Minor Caucasus, Central Asia and Kazakhstan, and to a lesser extent in the Crimea, Carpathians and Pribaikalia, etc. In about 90% of the cases mud flows are produced by intense rain downpours in spring and the end of summer. Various instances of severe mud flows that occurred in recent years in various regions of the U.S.S.R., their causes and extent of damage produced are described with the aid of photographs. Measures for preventing mud flows are considered. *Subject Headings:* **1. Flash floods 2. Mud flow prevention methods 3. U.S.S.R.**—*I.L.D.*

12.9–411 551.579.5:551.491

Childs, E. C., **A treatment of the capillary fringe in the theory of drainage, Pt. 2, Modifications due to an impermeable sub-stratum.** *Journal of Soil Science*, Oxford, 11(2):293–304. Sept. 1960. 8 figs., table, 3 refs. **DLC**—When a drainage system copes with both artesian and precipitated water the streamline dividing the two flow zones panes through a stagnation point in the medial vertical plane parallel to the drain lines. The approximation is made that the water-table and capillary fringe boundary may be regarded as those appropriate to precipitated water only, in the presence of an impermeable bed passing through the stagnation point. While the absolute heights may be in error it is shown that the partition of the capillary fringe about the water-table location in the absence of a fringe is given with only small error. This partition is calculated from hodograph theory with the aid of Edsac II for combinations of three values of precipitation rate, seven values of fringes thickness, and nine values of depth of impermeable bed. By interpolation, curves are presented to show the partition for combinations of three selected precipitation rates, five depths of bed, and continuous variation of fringe thickness. It is shown that for high precipitation rates the greatest fringe thicknesses are accommodated almost wholly above that surface which would have been the water table in the absence of a fringe, while for the lowest rates of precipitation and zero bed depth only 30% of the fringe is so accommodated; the remainder is below. *Subject Headings:* **1. Soil moisture studies 2. Drainage 3. Soil moisture conductivity 4. Capillary conductivity in soil 5. Water table.**—*Author's abstract.*

12.9–412 551.586:551.579.5:633.73

Lemée, Georges and Boyer, Jacques, **Influence de l'humidité du sol sur l'économie d'eau et la croissance des caféiers du groupe Canephora cultivés en Côte d'Ivoire.** [Influence of soil moisture on the water economy and on the growth of coffee-shrubs of the Canephora group cultivated on the Ivory Coast.] *Café, Cacao, Thé*, Paris, 4(2):55–63, May/Aug. **1960.** 8 figs. 2 tables.—Carrying out of a program on eco-physiology of Canephora at the Ivory Coast. Experimentation and observation on Kouilou of Touba (the most resistent against drought) and Robusta Ineac (the most sensitive) have made it possible: 1) to analyse the physiological reasons of this difference; 2) to determine the natural criteria supporting the drought and the water requirement criteria. The authors make an analysis of the greater resistance against drought of the Kouilou of Touba in comparison with the Robusta Ineac and determine the relations between water balance and maximum vegetative growth for the two species. In the selection of the varieties, climatic data for the Ivory Coast are always a basic factor needing only adaptation to the different zones. Previously, experiments had to be made on drought resistance and its action upon produce. *Subject Headings:* **1. Plant physiology 2. Water balance of plants 3. Soil moisture effects on coffee plants 4. Drought resistance 5. Coffee culture 6. Ivory Coast.**—*A.V.*

12.9–413 551.579.5:631.4

Leyton, L. and Yadav, J. S. P. (*Department of Forestry, Oxford University*), **Effect of drainage on certain physical properties of a heavy clay soil.** *Journal of Soil Science*, Oxford

(2):305–312, Sept. 1960. 2 figs., 3 tables, 6 refs. **DLC**—Comparisons of the physical properties of a drained and undrained heavy clay soil revealed a higher content of water-stable aggregates, a higher proportion of larger pore spaces and a greater vertical and lateral hydraulic conductivity in the former. The difference generally decreased with depth; at about 15 in. there was generally little difference between the two soils. Despite possible initial differences in texture, the difference can be interpreted as being largely due to the effect of drainage on aeration. *Subject Headings:* **1. Soil moisture physics 2. Soil-moisture relationships 3. Drainage.**—*Authors' abstract.*

12.9–414 551.579.5:551.577.2:551.573 551.577.38(44)

Mériaux, Suzanne, **Economie de l'eau en saison sèche dans les sols de la région de Dijon.** [Water management during the dry season in the soils of the Dijon region.] *Académie d'Agriculture de France, Paris, Comptes Rendus*, 46(8):491–498, May 4, **1960.** 2 figs., 2 tables. **DLC**—Study of the water balance in the soils of an experimental station near Dijon. The results are presented by calling upon the concepts of actual and theoretical deficit. The theoretical deficit is computed by the difference between the potential evapotranspiration and the rainfalls. It represents the maximum quantity of water that could be extracted by evapotranspiration from a soil of which the moisture should always be near the retention capacity, and of which the vegetal cover should be continuous and sufficiently dense. The actual deficit represents, at a given moment, the quantity of water effectively taken up by evapotranspiration on the soil reserves. It is expressed by the quantity of water necessary so that the retention capacity should be reached for the whole of the profile. For a continuous vegetal cover, the difference between the theoretical deficit and the actual deficit observed constitutes an index of the drought intensity. Two graphs reproduce these differences for the months of April to October 1958 and 1959 and give evidence of the severity of the drought during the 1959 summer and its influence on yields. *Subject Headings:* **1. Drought, France (1959) 2. Drought effects on crops 3. Water management 4. Evapotranspiration 5. France.**—*A.V.*

12.9–415 551.579.5:551.577:551.573

Turc, Lucien (*Soils Lab., Centre National de Recherches Agronomiques*, Versailles), **Le bilan d'eau des sols: relations entre les précipitations, l'évaporation et l'écoulement.** [The soil water balance: inter-relations of rainfall, evaporation and run off.] *Sols Africains* (Paris?), (1):138–172, (**1954?**). 13 figs., tables, refs., p. 164 and 166, numerous eqs. In French and English. "This article summarizes a paper (Thesis, Univ. of Paris, 1953), which is to appear in *Annales Agronomiques*." **DWB** (M79 S684bi)—Knowledge of the natural water-balance is incomplete and estimates that have been made often contain errors. For that reason we have tried, by comparing known facts in this realm concerning the world's principal climatic regions, to compose a synthesis of present knowledge in order to make plain the simplest and most general relations arising from such a comparison. We have established formulae which make it possible to evaluate the terms of the water balance in function of precipitation and temperature, for which most of the world's meteorological stations now publish satisfactory statistics. The concepts developed are based on the study of river basins and lysimeters. The data are presented in graphs and charts. *Subject Headings:* **1. Soil water balance 2. River basin studies 3. Lysimeter investigations 4. France 5. Germany 6. United States 7. Ethiopia.**—*E.Z.S. and Introd.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY (551.58)

See: **First Weather Reconnaissance System Symposium** (Univ. of Mich), 12.9–3; **Forest climatology handbook** (Geiger), 12.9–13; **Fire season severity rating** (Williams), 12.9–83; **Principles of radio climat.** (Du Castel, Misme), 12.9–102; **Climatic diagrams** (Lauer), 12.9–261.

CLIMATIC ZONES (551.581)

See: **Agric. revolution, N. Australia** (Christian), 12.9–72.

CLIMATE OF PARTICULAR PLACES (551.582)

See also: **Geogr. of Peru Current region** (Schweigger), 12.9–6; **Forest climatology handbook** (Geiger), 12.9–13; **Antarctic geography** (Lebedev), 12.9–21; **Ant. Exp. South Pole** (Borchgrevink), 12.9–22; **Climat. maps, Indochina** (Grimes), 12.9–63; **Climat. maps, Morocco** (Grimes), 12.9–64; **Fire weather clim. data, Washington (State)** (Lindquist), 12.9–79; **Forest fires, Brit. Columbia, 1958** (Turner), 12.9–82; **Upper air radioclimat., N. France** (Misme), 12.9–101; **Monthly evap. maps, Ukraine** (Kaganer, Ogievskaia), 12.9–364; **Local rainfall map comp.** (Johnston, Holmes), 12.9–384; **Climatography of Alaska, U. S. W. B.** (Watson), 12.9–427.

12.9–416 551.582.2(678.2)

*Freyvogel, Thierry A., **Einige meteorologische Daten aus Südtanganyika.** [Some meteorological data from Southern Tanganyika.] *Acta Tropica (Review of Tropical Science and Tropical Medicine)*, Basel, 17(4):365–374, **1960.** 5 figs., 9 tables, 9 refs.—Summary of climatological observations made at the Biologic Research Center of Ifakara (Eastern Province, Tanganyika-Territory) located at 8°9′S and 36°40′W. The climatic data is tabulated as follows: pressure, temperature and humidity for March 1956–April 1957, rainfall data for 1931–1959. The annual temperature variation goes through a maximum in Feb. (31°1C) and through a minimum in July (21°6C). The absolute maximum ranges about 41°C and the absolute minimum 14°C. The rainfall regime has 5 months dry season (June–Oct.); April is the most rainy month of the year (339 mm). The mean annual rainfall is 1286 mm. *Subject Headings:* **1. Climatic data 2. Annual temperature variations 3. Rainfall regime 4. Ifakara, Eastern Province, Tanganyika.**—*A.V.*

12.9–417 551.582.2(689)

*Rhodesia & Nyasaland. Meteorological Service, **Climate data for Goetz Observatory, Bulawayo.** Its *Climate Information Sheets*, No. 1, issued Salisbury, Dec. **1957.** 6 p. Mostly tables. Also their: **Climate data for Salisbury Observatory.** Its *Climate Information Sheets*, No. 2, issued Salisbury, Dec. **1957.** 3 p. entirely tables.—The first sheet gives climate data for Goetz Observatory, Bulawayo. The text discusses the tabulated data. Monthly mean values of a number of climatological variables are tabulated for a period of 20 yrs from July 1936 to June 1956. The period used in the case of rainfall spans sixty yrs, 1896–1956. The standard deviations of the individual monthly means have also been tabulated. The second presents similar data for Salisbury Observatory. The data is tabulated in the same manner as those of Goetz Observatory. *Subject Headings:* **1. Climatic data 2. Rhodesia.**—*I.S.*

12.9–418 551.506.3:551.582.2(773)

*U. S. Weather Bureau, **Summary of hourly observations, Moline, Illinois, 90th meridian time zone.** Its *Climatography of the United States*, No. 30-11, **1956.** 15 p. mostly tables. **DWB**—A 5 yr (Aug. 1949–July 1954) summary of surface weather data, recorded at the Quad City airport, Moline, Illinois. Data consisting of hourly observations for each month of the year are tabulated. The tables pertain to: a) temperature and wind speed-relative humidity, b) percentage frequencies of wind direction and speed, c) hourly occurrences of precipitation amounts, d) percentage frequencies of ceiling-visibility occurrences, and e) percentage frequencies of sky cover, wind and relative humidity. *Subject Headings:* **1. Surface data 2. Hourly observational data 3. Climatic summaries 4. Moline, Illinois.**—*I.S.*

12.9–419 551.582.3:551.524(262.5)

Zemliakov, V. M., **Kharakteristika temperatury vozdukha nad Chernym morem.** [Air temperature characteristics over the Black Sea.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 8:156–164, **1957.** 4 figs., table, 2 refs. **DLC** (Slavic)—The characteristics of atmospheric temperature distribution over the Black Sea are examined on the basis of 54,380 ship observations made during 1881–1953. Maps with isolines of mean annual air temperature and mean Jan., May and July air temperatures over the Black Sea and data on mean monthly air temperatures over different sections of the Black Sea are presented. The annual variations of maximum and minimum air temperatures over the shores and waters over different sections, etc. are discussed. *Subject Headings:* **1. Atmospheric temperature distribution 2. Black Sea.**—*I.L.D.*

CLIMATIC CHANGES (551.583)

See also: **Glaciers and climatic changes** (Nye), 12.9–137; **Climate of Karsa Glacier, Sweden** (Wallen), 12.9–139; **Temp. fluctuation and trend** (Callendar), 12.9–343; **Warming trend at Little America** (Wexler), 12.9–344.

12.9–420 551.4:551.583

Bunting, B. T. (*Dept. of Geography, Birkbeck College, London Univ.*), **The development of landscapes by past climates.** *Times Science Review*, London, No. 39:10–12, Spring **1961.** 4 figs.—Major difference or minor elaboration of landscapes are now explained in terms of changing energy of erosional processes which can vary both in place and time. Minor changes of climate accelerate or retard such processes; major climatic changes replace one dominant set of landscape-forming processes by something completely new. This paper describes a generalized picture which has been built up of the effects produced on landscape formation by the major climatically controlled systems to which such names as "periglacial," "warm-temperate," "sub-arid" and "tropical" have been given. *Subject Headings:* **1. Paleoclimatology 2. Climatic variations 3. Effect of climate on landscapes.**—*R.B.*

12.9–421 551.583:551.513.2

Willett, H. C. (*Massachusetts Inst. of Technology*), **Climatic changes.** *Colorado. Univ. High Altitude Obs. Institute for Solar-Terrestrial Research, Technical Report*, No. 1, p. 59–64. Corrected and reissued May **1957. DWB** (M13.1C719t)—There exists a broad spectrum of climatic types and of atmospheric circulation patterns. The discussion of three patterns includes high latitude zonal circulation, cellular blocking and low latitude zonal circulation. At present, the author argues, purely physical or statistical approaches to long-range forecasting are inadequate, except by comparisons of climatic and solar cycles. The second part of the discussion describes past climates and glacial-interglacial sequence, post-glacial climatic fluctuations and the past observational time of two centuries. *Subject Headings:* **1. Climatic changes 2. Paleoclimatology 3. Long range forecasting.**—*K.C.*

12.9–422 551.583.3(517)

Hoyanagi, Mutsumi (*Defense Academy, Yokosuka, Japan*), **On the problem of climatic change during the historical period in Mongolia and Inner Asia.** *International Geographical Union, Proceedings of the Regional Conference, Japan, 1957.* Issued Tokyo, **1959.** p. 134–137. 4 figs. **DWB** (910.6 I61pr)—Fixed dunes are being eroded by what appears to be an accelerated wind regime. Rainfall fluctuations are indicated by historical records as well as by study of the variations in the characteristics of tree rings. *Subject Headings:* **1. Historical climates of Mongolia.**—*E.Z.S.*

12.9–423 551.583.3:551.312.2

Jacobsen, N. Kingo, **Geest-topografi under Tøndermarsken, Geestoverfladens morfologi i Vøgeltønder Kog, beskrivelse og forsøgsvis tolkning.** [Topography of the Late-Glacial subsurface in the salt-marsh area at Tønder.] *Geografisk Tidsskrift*, Copenhagen, 59:141–180, **1959.** 3 figs., 20 refs., fold. map in back, table. **DWB**—The graphical and tabulated results of 1445 detailed borings conducted on a 1600 ha salt marsh area at Tönder are discussed, and include a topographical description. Comparison with German and Dutch investigations is made for several possible interpretations. It is shown that the genesis of the region was governed by the changing climatic conditions of the Pleniglacial A and B periods in the Würm glaciation. *Subject Headings:* **1. Late glacial climates 2. Geological surveys 3. Salt marshes.**—*W.N.*

MICROCLIMATOLOGY (551.584)

12.9–424 551.584.65

†Podzimek, Josef (*Geophysical Inst., Czech. Academy of Science, Dept. of Met., Hradec Králové*), **An attempt at explaining the "breathing" of spaces in ice caves.** *Studia Geophysica et Geodaetica*, Prague, 2(2):165–173, **1958.** 2 figs., 11 refs., 9 eqs. **DWB**—A review of literature on ice caves. The author accepts the distinction between static and dynamic caves. The

ice cave at Dobsina in Slovakia is of the static type, having previously been dynamic. Detailed study of the micro-structure of flow and thermal conditions was made in Aug. 1954, and again in Feb. 1955. Because it was necessary to use simplifying assumptions in studying the breathing of spaces in ice caves, the author believes further study using recording instruments will advance the study of the pulsation mechanism. Schematic drawings of Dobsina ice cave are included. *Subject Headings:* **1. Ice caves 2. Cave microclimatology 3. Air flow in ice caves 4. Ice caves-static 5. Dobsina, Czechoslovakia.**—*E.Z.S.*

CLIMATIC CLASSIFICATION (551.585)

12.9–425 551.585:551.574.42:621.315(479)

†Chirakadze, G. I., **Skhema gololednogo raĭonirovaniia Zakavkaz'ia.** [Method of classification of the Transcaucasus by glaze regions.] *Tiflis. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ, Trudy,* (pub. Leningrad), No. 4:124–152, **1959.** 5 figs., table, 31 refs. **DWB**—The significance of a classification of the Transcaucasus by glaze regions to the transmission of electric power and to communication, the difficulties in obtaining data on the actual icing of wires, the inadequacy of experimental data on glaze formation on stands which are 2 met above the ground and the physical characteristics of solid hydrometers causing icing of wires such as the processes of formation of the different forms of icing, the intensity and amount of ice deposition, the specific gravity of the different types of icing etc. are discussed. The data on glaze incidence used in this study included the following, viz: material on actual damage to wires resulting from glaze deposits available in the archives, observations provided by 30 glaze stations in the Georgian SSR, meteorological data for Transcaucasus, actual observations on glaze occurrence on transmission lines etc. The rate of microrelief, wind velocity and direction of air temperature, wet snow, large bodies of water as in the occurrence and intensity of icing is discussed and climatic indices on the number of days with glaze and the relationship of rime, fog and wet snow to glaze formation is examined. The method of dividing the Transcaucasus into glaze regions on the basis of the incidence of icing, of glaze, maximum dimensions of the deposit of glaze on both sides of the ellipse, index of direction and velocity of wind and damage to transmission lines during a year is described and the resulting six regions are described with the aid of maps. *Subject Headings:* **1. Climatic classification schemes 2. Glaze distribution 3. Icing of transmission lines 4. Transcaucasia, U.S.S.R.**—*I.L.D.*

12.9–426 551.585(529)

Wang, Chung-Chi (*Taiwan Univ. Nationale, Taipei, Formosa*), **Recherches sur les types climatiques de Taiwan.** [Research on the climatic types of Taiwan.] *International Geographic Union, Proceedings of the Regional Conference, Japan, 1957.* Issued Tokyo, **1959** p. 209–214. 17 figs., 15 refs. **DWB** (910.6 I61pr)—The climate of Taiwan is influenced by its latitude, the distribution of land and sea, ocean currents, topography and typhoons. Three types, Taipei, Nilan, and Sinchu are found in the north, two types in the south—Pingtung Taitung; and in Central Taiwan, transitional types ranging from true coastal to true continental. *Subject Headings:* **1. Climatic classification 2. Climates of Taiwan 3. Taiwan** —*E.Z.S.*

12.9–427 551.585(798) 551.582.2/3(798)

*Watson, C. E. (*W. B. State Climatologist*), **Climates of the states: Alaska.** *U. S. Weather Bureau, Climatography of the United States* No. 60-49, Sept. **1959.** 23 p. tables, maps **DLC, DWB**—A publication, extensively illustrated by tables and maps, containing information on the climate of Alaska. Four major zones of Alaskan climate are described. These are 1) the zone of dominant maritime influence, 2) the transition zone from maritime to continental climatic influences, 3) the dominant continental zone, and 4) the zone of dominant Arctic influences. The freeze data (1921–1950), mean temperature and precipitation (1921–50), and normals, means, and extremes are tabulated. The maps show mean annual precipitation (1931–55) and mean maximum and minimum temperature (1931–52) for Jan. and July *Subject Headings:* **1. Climatic classifications 2. Climate of Alaska 3. Alaska, U. S. A.**—*I.S*

BIOCLIMATOLOGY (551.586)

See also: **Obituary of Franz Sauberer** (Eckel), 12.9–61; **Polish bioclimat. literature, 1930–1958** (Tyczka), 12.9–65; **Forest steppe agroclimat, Ukraine** (Buchinskiĭ et al.), 12.9–73; **Wheat and maize phytoclimate in dry winds** (Buchinskiĭ), 12.9–74; **Maize climates** (Kalmykova), 12.9–75; **Chinese agromet.** (Sinel'shchikov), 12.9–76; **Influence of soil moisture on coffee-shrubs on Ivory Caost** (Lemée, Boyer), 12.9–412. *Also see:* **Medical Meteorology Section, 12.9–89 to 12.9–93.**

12.9–428 551.586:551.551

Parczewski, Wladyslaw (*Dept. of Met. and Climatology, Coll. of Agriculture*), **Classification of wind speed intervals in climatic and bioclimatic studies.** *Acta Geophysica Polonica*, Warsaw, 8(3):258–261, 1960. 2 tables, 9 refs. English summary p. 258. Polish summary p. 261. **DLC, DWB**—The author suggests for climatological and bioclimatological studies of a scale of wind speed intervals, the limiting values of which would correspond to the values of 4m/sec and 10 m/sec. Since sudden turbulence of air currents occurs when these values are exceeded, a scale of this kind would allow to correlate the results of those studies and the course of processes such as evaporation, vertical transport (convection) of water vapor, atmospheric pollution and thermal energy, and to determine the conditions of occurrence of the following phenomena: radiation and advection fogs and others. *Subject Headings:* **1. Wind speed-bioclimatic relationships 2. Wind speed effects.**—*Author's abstract.*

12.9–429 551.586:551.524.36:312.26(94)

Rankin, D. W. (*State Dept. of Health, Melbourne*), **Mortality associated with heat wave conditions in the Melbourne metropolitan area, Jan. and Feb. 1959.** *Australian Meteorological Magazine*, Melbourne, No. 26:96–98, Sept. 1959. 2 figs. **DWB**—Mortality figures associated with heat wave conditions are represented by two histograms. The first histogram shows number of deaths each two-day period associated with two periods of excessive heat during Jan. and Feb. During these two periods the total number of deaths was 145. The second histogram represents 108 deaths associated with heat wave conditions during Jan.–Feb. 1959. Reportedly, most of the fatal illnesses, as well as deaths, occurred during the first period (Jan. 1 to 25) of excessive heat. *Subject Headings:* **1. Heat wave effects on health 2. Melbourne, Australia.**—*I.S.*

ENVIRONMENTAL INFLUENCES (551.588)

See: **Climate morphology of rock formations** (Wilhelmy), 12.9–7; **Soil climate improvement Keyline Plan, New South Wales** (Yeomans), 12.9–8; **Differences in dust content** (Neuwirth), 12.9–299; **Summer—fall precip. differences** (Vujević), 12.9–388.

SYNOPTIC CLIMATOLOGY (551.589)

12.9–430 551.589

Fellows, Glenn E., **Synoptic climatology of meteorological parameters.** Meipar, Inc., Falls Church, Va., Contract AF 19(604)–4080, Final Report, May 15, 1958–May 14, 1959. Issued May 15, 1959. 7 p.—The primary effort under this contract has consisted of processing and reduction of meteorological (temperature, pressure, and wind) data supplied to us by the Air Force Cambridge Research Center and preparation of climatological charts and tables. Most of the data used were associated with climatological studies of radio-activity and of variations in wind velocity and direction. *Subject Headings:* **1. Synoptic climatology 2. Meteorological data processing.**—*Author's abstract.*

12.9–431 551.589(234.3)

Fliri, Franz (*Baumkirchen Tirol*), **Zur Methodik der dynamischen Klimakunde in den Ostalpen.** [The method of dynamic climatology applied to the Eastern Alps.] *Wetter und Leben*, Vienna, 12(1/2):6–14, 1960. 2 figs., 3 tables, 9 refs. German and English summaries p. 6. **DLC**—The dynamic climatological classification of the east-Alpine lands embraces a relatively short period 1948–1958 so that the year can be subdivided into three month seasons. The procedure for the dynamic climatological representation of the individual weather situation by means of mean air temperatures for the different weather situations individual seasons, the sums of temperature above a particular value and a dynamic climatological precipitation profile across the Alps from Garmisch to Como are presented. Tables giving the mean seasonal

temperatures according to weather situations (1948–1957), winter temperature distribution according to the most important weather situation for Innsbruck and Mittelberg, temperature sums above particular threshold values for Innsbruck and Mittelberg, number of days with precipitation of at least 0.1 mm less than 1 mm etc. are given. *Subject Headings:* **1. Synoptic climatology 2. Eastern Alps.**—*I.L.D.*

MISCELLANEOUS

COSMIC INFLUENCES (551.590)

See: **Sun-troposphere Conference, Leningrad, 1960** (Spiridonova), 12.9–51 and (Kolobkov), 12.9–52; **Solar radio waves** (Simon), 12.9–174; **Solar activity and general circulation** (Rakipova), 12.9–178; **Eclipse effects on met. variables** (Branicki), 12.9–181; **Eclipse expedition plans, Oct. 1958** (Low), 12.9–183; **Eclipse effects on F layer** (Setty), 12.9–216.

VISIBILITY (551.591)

12.9–432 551.521.31:551.591.1

Middleton, W. E. K., **Bouguer, Lambert, and the theory of horizontal visibility.** *Isis* Seattle, Washington, 51(164):145–149, June **1960.** 2 tables, 19 foot-refs., eqs. **DLC**— Pierre Bouguer (1729) discovered the first practical way of measuring light, as well as nearly all the usual photometric theory. He set up the exponential law of the attenuation of light in transparent media and applied it to the transmission of light in the sea and atmosphere. He also calculated the transmissivity of the air and dealt with the transmission of light coming from a body at a finite distance. The most important part of his **Traité d'optique** considers the amount of light reflected by the minute particles of translucent media, especially air. He allowed for earth curvature. Bouguer was the founder of the theory of the horizontal visual range. Lambert, (1774) did not acknowledge but repeated much of Bouguer's work. Allard, (1876) similarly, is credited with some of his findings. *Subject Headings:* **1. Horizontal visibility theories 2. Photometric theories 3. Bouguer, Pierre 4. Light measurement.** —*E.Z.S.*

12.9–433 551.501:551.591.3

Gavrilov, V. A., **Novyĭ metod opredeleniia gorizontal'noi prozrachnosti atmosfery.** [A new method of determining the horizontal transparency of the atmosphere.] *Meteorologiia i Gidrologiia*, Moscow, No. 11:53–57, Nov. **1959.** 2 figs., 2 tables, 2 refs., 10 eqs. **DWB, DLC**— The author presents a new method for measuring the transparency of the atmosphere based on the principle of relative brightness allowing the determination of meteorological visibility of $Z = 100–120$ or even 150 times. It is assumed that two absolutely black objects are situated at different distances on one visual line. The dimensions of the objects are so chosen that the nearer is projected on the background of the farther. In the case of high atmospheric transparency when the eye does not perceive a haze the nearer fuses with the farther and is not visible. In the presence of the smallest trace of haze the farther object becomes as it were and brighter the nearer black object becomes visible. The principle assumption of the method of related brightness is that for any atmospheric turbidity of for any brightness value of the haze on the more distant object the closer object will be always back i.e. its brightness may be regarded as zero. A description of the apparatus and of its operation is presented with the aid of photographs. The equation for measuring the contrast between the distant object under a haze and the haze at the horizon, the equation for the relative error of contrast determination, the equation for measuring the distance of visibility by the contrast method, etc. are developed. The results of measurements with the relative brightness method are presented and a comparison between this method and the photoelectric method is made. *Subject Headings:* **1. Atmospheric horizontal transparency determinations 2. Brightness measurement methods 3. Visibility determinations.**—*I.L.D.*

OPTICAL PHENOMENA (551.593)

See: **Upper air radioclimat., N. France** (Misme), 12.9–101; **Twilight and nocturnal emission in upper atmos.** (Robley), 12.9–227; **Observation of ice crystal haze by radar** (Hughes), 12.9–267; **Atmospheric transparency** (Paszyński), 12.9–337.

ELECTRICAL PHENOMENA (551.594)

See also: **Vegard's 80th anniversary** (Hylleraas), 12.9–60; **Principles of radio climat.** (Du Castel, Misme), 12.9–102; **Geomag., auroral, cosmic ray and solar activity** (Mariani, Molina), 12.9–177. *Also see:* **Whistler Section,** 12.9–201 to 12.9–207; **Ionosphere Section** 12.9–208 to 12.9–216; **Aurora Section,** 12.9–217 to 12.9–223.

12.9–434 551.594.11

Ogawa, Toshio (*Geophys. Inst., Kyoto Univ.*), **The structure of the atmospheric electric field.** *Journal of Geomagnetism and Geoelectricity*, Kyoto, 11(4):139–147, **1960.** 4 figs., 1 tables, 5 refs., 15 eqs. **DWB**—Simultaneous records of the atmospheric electric potential gradient at three stations which made a regular triangle with sides of about two km, were compared with each other during Jan. 8–13, 1956, including a cloudy day as well as fine days. Expanding the daily course of the potential gradient on each day and at each station into Fourier series of 12 terms, the spectral distribution of the square of the amplitude of each component was obtained and the spectrum of the field was given by n^{-4} in an undisturbed day, n expressing the harmonic term. On the theoretical grounds, assuming the distribution of space charge concentration characterized by its scale and its density within the lower layer of the atmosphere, the spectral distribution of field energy was suggested to be represented by n^{-7} in the intermediate range of n. The result was proved to be consistent with the above analytical result. The factor causing the disturbance in the spectrum was looked for into the atmosphere using the aerological data. It was found that the turbulent situation of the air in the lower altitudes up to three km would control the structure of the atmospheric electric field. *Subject Heading:* **1. Atmospheric electric field structure.**—*Author's abstract.*

12.9–435 551.594.11:551.578.11

†Ogawa, Toshio (*Geophysical Inst., Kyoto Univ.*), **Electricity in rain.** *Journal of Geomagnetism and Geoelectricity*, Kyoto, 12(1):21–31, **1960.** 8 figs., table, 18 refs., 14 eqs. **DWB**—The continuous observations of the rain current (i), the rate of rainfall (R') and the potential gradient (P) were made. Providing the Wilson's theory of ion capture by water drops, the quantitative representation between them is obtained using the size-distribution of raindrops by Marshall and Palmer as $i=2.12\times10^{-6}P_hR'^{0.84}-0.54\times10^{-6}P_hR'^{1.05}$, where i gives the maximum rain current and P_h is the potential gradient in the charging region of raindrops below the clouds. Applying the calculated result to the measured ones, it is found that P_h related to P by $|P_h|=3P^{1.3}$. The relation between the above results and Simpson's empirical ones is discussed. Further, some results in regard to the splashing effect of raindrops at the ground and to the mirror-image effect between the rain current and the potential gradient are described. *Subject Headings:* **1. Electricity in rain.**—*Author's abstract.*

12.9–436 551.594.13:535.4

El Nadi, Abdel Fattah (*Assiout Univ., Egypt*) and Farag, N. (*Cairo Univ., Egypt*), **The effect of monochromatic light on the concentration of large ions.** *Tellus*, Stockholm, 12(3):327–331, Aug. **1960.** 5 figs., 4 tables, 6 refs. **DWB**—The divided electrode condenser is used to study the effect of monochromatic light of wave lengths between 4,030 and 6,610 A (using 10 interference filters of jena glass), on the concentration of large ions having mobilities below 1.0×10^{-4} cm/sec:volt/cm. The number of ions per cc is measured with the aid of the characteristics obtained for each wave length at different group mobilities, both in the presence of light (N_1) and in complete darkness (N_2). The ratio (N_1/N_2) is obtained for each filter and for the four mobility groups, i.e., 6.90×10^{-4}, 2.22×10^{-4}, 1.02×10^{-4} and 0.60×10^{-4} cm/sec.:volt/cm. The results are discussed on the basis of statistical analysis by applying the correlation and significance tests. *Subject Headings:* **1. Ion concentrations 2. Monochromatic light effects on ions.**—*Authors' abstract.*

ACOUSTIC PHENOMENA (551.596)

See: **Explosive waves from eruption of Volcano Sakurajima** (Yasui, Ijichi), 12.9–158.

PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON PLANETARY ATMOSPHERES

1. PLANETS IN GENERAL AND THE EARTH

By: Andrew J. Meglis and Geza Thuronyi

INTRODUCTION

With the advent of space travel, interest in the physical conditions existing on the Moon and planets has become increasingly widespread. In order to help satisfy some of the needs for documentation in this field, a bibliography on planetary atmospheres and other physical conditions on the Moon and planets was prepared. The volume of literature is such that it was not possible to compile an exhaustive bibliography. In selecting the material to be included, an attempt was made to choose samples from a variety of sources and subject matter rather than to cover one or a few aspects thoroughly. This policy was adopted in order to enhance the usefulness of the bibliography especially to those newly engaged in planetary studies, by providing them with a larger number of possible approaches. For the same reason some material of historical interest was included although emphasis was placed on recent material.

Despite considerable selectivity, the material accumulated was too large for publication in a single issue. The bibliography will therefore be published in three parts. This first part covers planetary atmospheres in general and planetary aspects of the Earth's atmosphere. The second part (to be published in the Oct. 1961 issue) will cover the planets Mercury, Mars, and Venus, and the third part (Nov. 1961) will deal with the Jovian planets and the Moon.

While atmospheric conditions on the planets are the principal subject of this bibliography, some literature on other physical conditions (albedo, radiation, radio emission, surface features, etc.) has been included. The OUTLINE OF CONTENTS below is a systematic listing of the various subjects covered.

The material in this bibliography has been arranged chronologically by year of publication, and alphabetically by author within each year, except for a few items added at the end as supplementary material.

We wish to express our appreciation to R. Baker of the British Meteorological Office, S. L. Hess of Florida State Univ., D. W. McLeod and J. W. Salisbury of the U. S. Air Force Cambridge Research Laboratories, A. Vandenplas of the Institut Royal Météorologique, Belgium, L. D. Kaplan, G. P. Kuiper, and others for valuable suggestions related to material selected.

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1884

12I–1 551.510.5

Rogovskiĭ, E. A., **O stroenii zemnoĭ atmosfery i obshchikh zakonakh teorii gazov.** [Structure of the earth's atmosphere and general laws in the theory of gases.] *Russkoe Fiziko-Khimicheskoe obshchestvo, Zhurnal, Fizicheskiĭ Otdel, Otdel Pervyĭ,* 16(2):25–48; 16(4):185–212, **1884.** 4 tables,

numerous foot-refs., 136 eqs. **DLC** (Also shorter version as **O stroenii zemnoĭ i planetarnykh atmosfer.** [Structure of the terrestrial and planetary atmospheres.] *Russkoe Astronomicheskoe Obshchestvo, Izvestiia*, 11(8/9):311–344, Jan./Feb. **1906.** 36 p. 3 tables, numerous foot-refs., 101 eqs. **DLC** (QB1.R9) **DWB** (MO400R35)—Starting from the barometric formula of Laplace and Maxwell's dynamical theory of gases the author develops an elaborate system of formulas for calculating the distribution of density, pressure and temperature and of the various atmospheric constituents with height. Calculated values of atmospheric density are tabulated for altitudes up to 150 km. Calculated amounts of pressure are compared with observed ones up to heights of 1884 m. The weakest point of theory is found to be a lack of precise knowledge of the law of temperature distribution in the quiet atmosphere. Such knowledge could be obtained by mastering the theory of radiation equilibrium in the atmosphere. Although the author's calculations are based on conditions existing in the Earth's atmosphere, the theory is applicable to planetary atmospheres as well. *Subject Headings:* **1. Atmospheric structure 2. Barometric formulas.**—*G.T.*

1897

12I–2 523.4:551.510.41:533.7

Stoney, G. Johnstone, **Of atmospheres upon planets and satellites.** *Royal Dublin Society Scientific Publications*, Ser. 2, 6(13):305–328, **1897.** eqs. **DWB** (M0405 S881)—An intricate discussion concerned with calculation of the mean density and velocity of the lightest gas which each planet and the sun can hold (by gravitation) in its respective atmosphere. Basic factors are enumerated briefly for purposes of calculation. Utilizing kinetic theory the author begins his speculation by calculations for the earth, and then extends the process to the other planets (asteroids are considered only briefly). Numerous equations accompany the text. *Subject Headings:* **1. Planetary atmospheres 2. Kinetic theory of gases.**—*A.J.M.*

1934

12I–3 551.51:523.4

Adams, Walter S., **The planets and their atmospheres, Pt. 1, Methods of study.** *Carnegie Institution of Washington, News Service Bulletin (Staff Ed.)*, 3(13):94–98, April 8, **1934.** 3 photos. **Pt. 2, Conditions revealed.** *Ibid.*, 3(14):99–104, April 8, **1934.** 8 photos. **DWB** (523.4 A219p)—Part 1 is a brief introduction to the study of planets covering: methods of study; obstacles in determining temperature and surface markings; physical characteristics (mass, temperature, atmospheric constituents); and factors affecting physical conditions on the planets (speed and period of rotation and revolution, distance from sun, etc.). In Pt. 2 the author outlines in more detail the information known about Mercury, Venus, Earth and Moon, Mars, asteroids, Jupiter, Saturn, Uranus, Neptune and Pluto, in such areas as temperature, period of rotation, atmosphere and its constituents, surface markings spectroscopic bands, and finally, possibility of life of some kind (on Mars and Venus). *Subject Headings:* **1. Physical conditions on planets 2. Planetary meteorology.**—*A.J.M.*

1941

12.I–4 551.590.21:551.515:523.43

Bernard, Pierre, **Les perturbations atmosphériques de la Terre et de Mars.** [Atmospheric perturbations of the Earth and of Mars.] *Académie des Sciences, Paris, Comptes Rendus*, 213:980–982, Dec. 29, **1941.** fig., table, 5 refs. **Comment** by Charles Maurain, p. 983. **DLC**—It has been found that the frequency and intensity of terrestrial cyclones are dependent on solar phenomena. This conclusion is supported by observations which showed a simultaneous occurrence of atmospheric perturbations on the planet Mars. The patches appearing on the Martian surface are of atmospheric origin and are the result of atmospheric perturbation. In his comment MAURAIN recommends further observations to confirm BERNARD'S thesis. *Subject Headings:* **1. Atmospheric disturbances 2. Solar effects on the atmosphere.**—*E.K.*

12I–5 523.4

Jeans, Sir James, **The physical condition of the planets.** *Nature*, London, 147(3731):526–529, May 3, **1941. DLC**—The treatment of individual planets is followed by an attempt to form a physical picture of the system as a whole. There is a sequence of planets in which the physical conditions vary continuously, giving place to cold absolute aridity to an abundance of water or ice while the atmospheres increase in depth and extent and hydrogen probably increases from nil to a large amount, existing in the form either of free hydrogen or of its compounds, especially methane. The idea that life can progress along the planetary sequence is considered illusory. *Subject Headings:* **1. Physical conditions on planets 2. Planetary meteorology.**—*E.K.*

1947

12I–6 551.521.18:523.4

Kuiper, Gerard P. (*McDonald Obs.*), **Infrared spectra of planets.** *Astrophysical Journal*, Chicago, 106(2):251–254, Sept. **1947.** 9 figs., 2 refs. **DLC** (QB1.A9)—A short article analyzing records obtained with a PbS cell of the infrared spectra of Venus, Jupiter and Saturn. *Subject Headings:* **1. Planetary spectra 2. Infrared spectra of planets.**—*Author's abstract.*

1948

12I–7 551.51:523.4

Flagstaff, Arizona. Lowell Observatory, **Project on planetary atmospheres.** Contract CWB-96, Report No. 1, Jan. 1–July 1, **1948.** 15+20 p. Contents: Hess, Seymour L., **Meteorological approach to the question of water vapor on Mars and the mass of the Martian atmosphere.** 15 p. Menofsky, H. A. and Hess, S. L., **Notes on the meteorology of Jupiter.** 20 p.

Report No. 2, July 1–Dec. 31, **1948.** 27 p. Contents: Hess, Seymour L., **Investigations of planetary atmosphere,** p. 1–23. Johnson, Harold, **Photometric investigations of planetary atmosphere,** p. 24–27.

Report No. 3, Jan. 1–June 30, **1949.** 14 p. Contents: Hess, Seymour L., **Mars,** p. 1–5. Menofsky, Hans A. and Hess, Seymour L., **Jupiter,** p. 6–10. Giclas, H. L., **Photometric investigations,** p. 11–14.

Report No. 1 (This and succeeding reports are on their Contract AF 19(122)-162), Aug. 1–Oct. 31, **1949.** 6 p. 3 refs. Blackadar, Alfred K., **Scattering of blue light in the Martian atmosphere.**

Report No. 2, Nov. 1, **1949**–Jan. 31, **1950.** 11 p. Contents: Hess, Seymour L., **Variation in the amounts of gaseous methane and ammonia on the visible disc of Jupiter.,** p. 1–6. Hess, Seymour L., **Color changes on Mars,** p. 6–8. Giclas, Henry L., **Direct photoelectric photometry,** p. 9–11.

Report No. 3, Feb. 1–April 30, **1950.** 14 p. Contents: Hess, Seymour L., **Variation in the amount of gaseous methane on the visible disc of Jupiter,** p. 2–3. Hess, Seymour L., **The general atmospheric circulation of Jupiter,** p. 4–7. Giclas, Henry L., **Direct photoelectric photometry,** p. 8–14.

Report No. 4, May 1–July 31, **1950.** 7 p. Contents: Hess, Seymour L., **Variation in the amount of gaseous methane on the visible disc of Saturn,** p. 1–2. Hess, Seymour L., **Planetary photographs in the light of atmospheric absorption bands,** p. 3–4. Giclas, Henry L., **Direct photoelectric photometry (Measurements for solar variation),** p. 4–7.

Annual Report (i.e., Report No. 5), Aug. 1, **1949**–Sept. 30, **1950.** 94 p. Contents: Blackadar, Alfred K., **On the scattering of blue light in the Martian atmosphere,** p. 3–18. Hess, Seymour L., **Variations in atmospheric absorption over the discs of Jupiter and Saturn,** p. 19–30. Hess, Seymour L., **Planetary photography in the light of atmospheric absorption bands,** p. 31–34. Hess, Seymour L., **Color changes on Mars,** p. 34–38. Hess, Seymour L., **General atmospheric circulation of Jupiter,** p. 39–46. Giclas, Henry L., **Direct photoelectric photometry, (Measurements for solar variation),** p. 47–63. **Bibliography of spectroscopy and radiometry of planetary atmospheres (and related objects) 1920–1950,** p. 67–70. **Summary of the Conference on Planetary Atmospheres held at the Lowell Observatory, Flagstaff, Arizona, March 17–20, 1950,** p. 79–93.

Report No. 6, Sept. 30–Dec. 30, **1950.** 12 p. Contents: Shapiro, Ralph, **The atmospheric pressure at the surface of Mars,** p. 1–9. Giclas, Henry L., **Direct photoelectric photometry (Measurements for solar variation),** p. 10–11.

Report No. 7, Dec. 30, **1950**–March 30, **1951.** 38 p. Contents: Shapiro, Ralph, **Study of the behavior of large scale cloudmasses in the earth's atmosphere,** p. 1–11. Shapiro, Ralph, **Quantitative study of bright and dark spots on Jupiter's surface,** p. 12–28. Giclas, Henry L., **Direct photoelectric photometry (Measurements for solar variation),** p. 29–37.

Report No. 8, March 30–June 30, **1951.** 7 p. Contents: Shapiro, Ralph, **Quantitative study of bright and dark spots on Jupiter's surface,** p. 1–2. Giclas, Henry L., **Direct photoelectric photometry (Measurements for solar variation),** p. 3–7.

Report No. 9, June 30–Sept. 30, **1951.** 98 p. Contents: Shapiro, Ralph, **Distribution and velocities of bright and dark spots on Jupiter's surface in 1928,** p. 1–11. Lorenz, Edward N., **Thermodynamic chart for Jupiter's atmosphere,** p. 12–20. Lorenz, Edward N., **Vertical extent of Jupiter's atmosphere,** p. 21–30. Hess, Seymour L., **Laboratory study of the curve of growth of ammonia,** p. 31–32. Giclas, Henry L., **Direct photoelectric photometry (Measurements for solar variation),** p. 33–56. **Summary of Conference on Solar Variation and Planetary Atmospheres, Lowell Observatory, Aug. 22–24, 1951,** p. 72–98. **DWB.** *Subject Headings:* **1. Planetary atmosphere research projects 2. Physical conditions on planets.**

12I–8 551.51:523.4

Perrin, René, **Application des équilibres métallurgiques au problème de l'atmosphère des planètes.** [Application of metallurgical equilibrium to the problems of the atmosphere of the

planets.] *Académie des Sciences, Paris, Comptes Rendus*, 226(15):1207–1208, April 12, **1948.** **DLC**—The knowledge of the equilibrium of gas, dross and metal at high temperatures before the occurrence of passive resistances caused by solidification and cooling leads to certain deductions the summary of which is that an atmosphere sensitive to oxygen is dependent on the chemical composition of the planets. Low density is incompatible with the existence of atmosphere. *Subject Headings:* **1. Planetary atmospheres 2. Chemical composition of planets.**—*E.K.*

1949

12I–9 551.511:551.513:532.

Fultz, Dave, **A preliminary report on experiments with thermally produced lateral mixing in a rotating hemispherical shell of liquid.** *Journal of Meteorology*, 6(1):17–33, Feb. **1949.** 24 figs. 3 tables, 21 refs., 8 eqs. Abstract p. 17. Also: **Experimental studies of a Polar vortex I.** *Tellus* 2(3):137–149, Aug. **1950.** 15 figs. (3 col.), 5 refs., 18 eqs. **DWB**—Elaborate experiments were performed, using a thin inverted hemispherical shell of liquid, arranged so it could be rotated and heated from below (the pole), in an attempt to reproduce the circulation patterns of the earth's atmosphere. Experimental procedures are described in detail with numerous photographs of the equipment and the patterns produced when ink, or tobacco mosaic virus solutions were injected under varying conditions of heating. Results compared graphically with computations of zonal winds for winter and summer, and application made to calculation of relation between rate of heating and total kinetic energy of relative circulation. Close agreement found between laboratory and natural circulations. (*Same item as* 3–43, March 1950, *Met Abs.*) *Subject Headings:* **1. Dynamics of the atmosphere 2. Planetary circulation.**—*M.R.*

12I–10 551.51:523.

†Gullstrand, T., **Atmosfarens sammansattning och egenskaper.** [Composition and properties of the atmosphere.] *Stockholm. (H) Tekniska Hogskolan. Institutionen för Flygteknik, Technical Notes*, No. 1, **1949.** 48 pages. 4 figs., tables, 54 refs., 40 eqs. **DBS**—This monograph covers the following topics: composition, temperature and structure of the atmosphere: derivation of equations relating barometric pressure to height considering an isothermic and polytropic atmosphere; the various types of standard atmospheres giving the fundamental constants and tables of values of pressure, density, temperature, speed of sound up to elevations of 50,000 ft. Approximate formulae for determining the variations of density with elevation are derived; methods of calculation of actual height of aircraft above the ground; velocity of sound; and equations and tables concerned with the dynamic and kinematic viscosity of air are included. The treatment is concise and the monograph is a good reference book. (*Same item as* 2D–199, April 1951, *Met. Abs.*) *Subject Headings:* **1. Nomograms 2. Atmospheric composition.**—*I.L.D.*

12I–11 551.510.5:523.4:523.0

Sytinskaia, N. N., **Est' li zhizn' na nebesnykh telakh.** [Is there life on celestial bodies?] Moscow, Akademiia Nauk SSSR, **1949.** 106 p. 10 figs., photos., refs. (*Akademiia Nauk SSS Nauchno-Populiarnaia Seriia.*) **DLC** (QB54.S95). Also: *her* **Est' li zhizn' na drugikh planetakh** [Is there life on other planets?] Moscow, Goskul'tirosvetizdat, **1952.** 61 p. 15 figs., photos 2 tables, refs. (*Bibliotechka v Pomoshch' Lektoru* No. 20.) **DLC** (QB54.S94)—The possibility of life on Venus, Mars and the Moon is discussed by analyzing the temperature range and the presence of water and air. Doubts are expressed about the possibility of life on Jupiter, Saturn, Uranus and Neptune, where the temperature ranges from −140° to −20°C. The same subjects are discussed in the more recent edition (1952) by the author. *Subject Heading:* **1. Life on planets.**—*S. Nowinski*

1950

12I–12 551.510.5:523.43:523.0

Becker, W. (*Hamburg, Germany*), **Leben auf anderen Planeten?** [Life on the other planets] *Umschau*, Frankfurt a.M., 50(13):397–399, July **1950.** 2 figs. **DLC**—Popular article on meteorological conditions on planets and their satellites. Special attention is given to Mars where conditions are found to meet the requirements of life and actual vegetative life may exist. A series of photos shows seasonal changes on Mars. A good photo of the moon's surface and pictures of Jupiter and Saturn are reproduced. *Subject Headings:* **1. Planetary atmospheres 2. Life on planets 3. Mars** —*G.T.*

12I–13 551.510.41:523.4:535.214:0

†Bibliography of spectroscopy and radiometry of planetary atmospheres (and related subjects) 1920 to 1950. (In: Flagstaff, Arizona. Lowell Observatory, **The project for the study of planetary atmospheres.** Contract AF 19(122)-162, Annual Report, Sept. **1950.** p. 67–70. mimeog.) **DW**

1) General references on planetary atmospheres—methods of investigation and characteristics of ectra and 2) specific references on the planetary atmospheres of Venus, Mars and the other major nets. (*Same item as* 3.7–100 and 6B–65, *Met. Abs.*) *Subject Headings:* **1. Spectroscopy bibliog-phies 2. Radiometry 3. Planetary atmospheres.**—*I.L.D.*

12I–14 551.521(02)

†Chandrasekhar, Subrahmanyan, **Radiative transfer.** Oxford, Clarendon Press, **1950.** 393 p. s., refs., eqs. Price: $8.50. **DLC** (QB461.C46), **DWB.** Transl. into Russian with title **Perenos histoĭ energii.** Ed. by E. S. Kuznetsova. Pub. Moscow, Izdatvo Inostrannoĭ Literatury, **1953.** 1 p. figs., bibliog. at end of each ch., eqs. **DLC** (QB461.C467)—A textbook which covers roughly and in great detail the modern theories of radiative transfer, scattering, polarization, ission, absorption, diffuse reflection, Rayleigh scattering and scattering by planetary atmospheres, diative equilibrium of a stellar atmosphere and other problems of astrophysics and radiation in an mosphere with varying geometrical, physical and chemical properties. After each chapter there is extensive list of annotated references on pertinent literature. The vast amount of theory which carefully developed, and the concrete application cited make this unique work invaluable to the teorologist working in radiation or optics. (*Same item as* 4.9–2 and 11B–31, *Met. Abs.*) *Subject adings:* **1. Radiative transfer textbooks 2. Planetary atmospheres 3. Scattering. I. Kuznetsova, S.** (*ed.*)—*M.R.*

12I–15 551.513:523.03

Conference on planetary atmospheres at Lowell Observatory, Flagstaff, Arizona, March 17–20, 50. (In: Flagstaff, Arizona. Lowell Observatory, **The project for the study of planetary atmos-eres.** Contract AF 19(122)-162, Annual Report, Sept. **1950.** p. 79–93.) **DWB**—The summaries topics discussed are presented. These were: water vapor on Mars, photographic and visual cts of observation for Mars, radiometry on Mars, photographic and visual facts of observation r Jupiter, methane and ammonia on Jupiter, the equatorial "acceleration" of Jupiter, composition d behavior of atmosphere of Venus and solar variations. (*Same item as* 3.7–92, *Met. Abs.*) *Subject eadings:* **1. Planetary atmospheres conferences 2. Atmospheric circulation 3. Astrophysics.**—*I.L.D.*

12I–16 551.557:551.513

Goldie, A. H. R., **The average planetary circulation in vertical meridian planes.** (In: Royal eteorological Society, Centenary Proceedings, **1950.** p. 175–180. 2 figs.) **DWB**—Mean wind rculation up to 45 km is represented in terms of resultant E–W motion; vertical motion is inferred om differences of density. In each hemisphere there are 2, or (doubtfully) 3, circulations in posite senses one over the other; this is explained by unequal heating of two atmospheric columns o to 250–370 mb. The lowest circulation is primary, the higher ones secondary. (*Same item as* 3–115, March 1951; and 4F–58, June 1953, *Met. Abs.*) *Subject Headings:* **1. Planetary circulation Upper air winds.**—*G.J.E.*

12I–17 551.521.14:523.4 523.035.313

†Horak, Henry G., **Diffuse reflection by planetary atmospheres.** *Astrophysical Journal,* 112(3): 5–463, Nov. **1950.** 10 figs., 10 tables, 24 refs., 23 eqs. **DLC**—Based on laws derived by Chand-sekhar, the author presents quantitative interpretation of observed albedo data (reflection, absorp-on, scattering and polarization) for several planets (Saturn, Venus, Uranus, Neptune). Theoretical rves are compared with observed data showing possible influence of Rayleigh scattering. (*Same em as* 2.4–193, April 1951, *Met. Abs.*) *Subject Headings:* **1. Albedo of planets 2. Planetary reflec-on.**—*M.R.*

12I–18 551.511

†Isimaru, Yukiti, **The mechanism of the earth's atmosphere. (First and second communica-ons.)** *Geophysical Magazine,* Tokyo, 21(4):269–301, 303–342, Aug. **1950.** 15 figs., 29 tables, 1 refs., 230 eqs. **DWB, DLC**—The earth's atmosphere is regarded as an ellipsoid balancing gravity gainst centrifugal force. The heat balance is determined by temperature difference equator-pole; ean lapse rate is represented by this/height of tropopause, giving a calculated value of 0.55°/100 m. elation between height and temperature of tropopause is discussed; tropopause is an oblate ellipsoid centricity 1/579. Seasonal variation and annual mean temperature at earth's surface are discussed athematically, including effect of land and sea distribution and ocean currents. In Pt. II author egards surface as a sphere; apparent center of gravity 128 km from geometric center. He calculates hape and temperature distribution of troposphere, ozonosphere and ozonopause (about 50 km) and nosphere. Results are in good agreement with those obtained by other methods up to 150 km

and he extends his calculations to 300 km for latitude 0–90°. The whole paper is a remarkable tou de force. (*Same item as* 2.10–53, Oct. 1951, *Met. Abs.*) *Subject Headings:* **1. Mechanics of th atmosphere 2. Atmospheric structure.**—*C.E.P.B.*

12I–19 551.510.41:523.

†Kuiper, Gerard, **Planetary and satellite atmospheres.** *Physical Society of London, Reports o Progress in Physics*, 13:247–275, **1950.** 10 plates, 2 tables, bibl. p. 273–275. **DWB**—Results o infrared spectroscopic observations of atmospheres of planets tabulated in a form which enable comparison with composition of earth's atmosphere. Visual and photographic observations of eac planet, and interpretation thereof given at considerable length. Several hundred references are give to the work of over a hundred authors in this field, and the literature is amply reviewed in the text The origin and photochemistry of planetary atmospheres and the literature on the Earth as a plane have been omitted from this discussion. (*Same item as* 3.11–92, Nov. 1952, *Met. Abs.*) *Subje Headings:* **1. Planetary spectra 2. Infrared spectroscopy 3. Carbon dioxide in the atmospheres o planets 4. Progress in physics.**—*M.R.*

1951

12I–20 521.

Barlow, E. W., **Planetary movements and phenomena.** *Marine Observer*, 21(153):171–179 July **1951.** 6 figs. **DWB**—A simple account of planetary orbits and apparent movements, con junctions and occultations, and visibility of Venus and Jupiter. *Subject Heading:* **1. Planetary orbit** —*C.E.P.B.*

12I–21 523.4:551.510.

Firsoff, V. A., **The air of other worlds.** *British Interplanetary Society, Journal*, 10(5):197–21 Sept. **1951.** 14 refs. **DLC**—Various ways of detecting the existence and the spectroscopic method determining the composition of planetary atmospheres are discussed. Current knowledge on th atmospheres of the Moon, Mercury, Venus, Mars, the Giant Planets and Pluto is summed up *Subject Headings:* **1. Planetary atmospheres 2. Spectroscopic study of planetary atmospheres.**—*G.*

12I-22 551.510.41:523.

†Herzberg, G., **Atmospheres of the planets.** *Royal Astronomical Society of Canada, Journa* 45(3):100–123, May/June **1951.** 15 figs., 3 tables, 27 foot-refs. **DLC** (QB1.R485)—This pape gives a review of the present status of spectroscopic investigations of planetary atmospheres includin that of the Earth. In the case of the Earth's atmosphere the recent discovery of OH in the spectru of the night sky by MEINEL is discussed and its importance for the phenomena in the upper atmo sphere is pointed out. The spectroscopic detection of CO_2 in the atmospheres of Venus and Mars discussed in some detail and laboratory investigations aiming at more accurate determinations CO_2 content, pressure and temperature in these atmospheres are discussed. The observations CH_4 absorption bands in the major planets and the satellite Titan are summarized and the possibilit of detecting molecular hydrogen by means of the quadrupole rotation-vibration spectrum is outline It is probable that one of the unidentified features in the spectrum of Uranus and Neptune is due the 3 – 0 band of the pressure-induced rotation-vibration spectrum of H_2. *Subject Headings:* **1. Plan tary spectra 2. Night airglow spectra.**—*Author's abstract.*

12I–23 551.510.4:523

Hess, Seymour L. and Panofsky, H. A., **The atmospheres of the other planets.** (In: **Com pendium of meteorology.** Boston, American Meteorological Society, **1951.** p. 391–398. 3 figs 2 tables, 11 refs.) **DWB**—Our knowledge on atmosphere of Venus, Mars and the major planets summarized. A table of the meteorological parameters, of the probable atmospheric constituent the values of adiabatic lapse rates and of the pressure and temperature of the "visible" surface given. Venus is probably covered by lower dust clouds and higher clouds of condensed CO_2 with high albedo (0.59). No oxygen or water vapor exists. Mars has the smallest albedo of all plane (0.15). The horizontal distribution of temperature and winds on Mars is shown on charts. T atmospheric circulation is very similar to the earth's. The only constituents of the major plane identified spectroscopically in their atmospheres are methane and ammonia, but hydrogen and heliu should also exist in large amounts. The surface temperature of Jupiter is found to be 150°I probably owing to an appreciable greenhouse effect. The distribution of spot periods on Jupit with latitude is shown. A correlation of 0.60 is found between the speed of the Red Spot on t Jupiter and the speed of the surface westerlies on earth. Relatively little is known on the atmo pheres of the other major planets. (*Same item as* 4.6–5, June 1953, *Met. Abs.*) *Subject Heading* **1. Planetary atmospheres 2. Compendium articles.**—*A.A.*

12I–24 551.510:523.2

†Landsberg, Helmut E., **Origin and physics of the atmosphere.** *New York Academy of Sciences, nsactions*, 2nd Ser., 13(5):154–159, March **1951.** 4 tables, 21 refs. **DWB**—A concentrated atment of many aspects of upper atmosphere research, beginning with several theories as to the gin of the earth's atmosphere; inferences as to its composition, based on spectroscopic determina- n of the composition of the atmospheres of Jupiter, Saturn, Neptune, Venus and Mars; tempera- es of the planet Mars; new information on the composition of the earth's atmosphere from spec- scopic and rocket observations; physical structure of the atmosphere (exosphere, ionosphere, atosphere and troposphere) and, finally, theories of the general circulation, based on Krakatoa ption and ideas of FERREL, ROSSBY and PETTERSSEN. (*Same item as* 3.5–109, May 1952, *Met. s.*) *Subject Headings:* **1. Origin of atmosphere 2. Atmospheric composition 3. Atmospheric ucture 4. Planetary atmospheres.**—*M.R.*

12I–25 551.513

Raethjen, Paul, **Das planetarische Zirkulationssystem.** [The planetary circulation system.] *nalen der Meteorologie*, 4(1–6):65–75, **1951.** 5 figs., table, 7 refs., 4 eqs. German and English mmaries p. 65. **DWB**—Author separates the planetary and monsoon-like parts of the general rculation. A figure shows for 90°N–90°S, for Jan. and July, pressure at 250 gdm, and its monsoon mponent, gradient, percentage of land, and roughness parameter. The monsoon component is rted. The planetary circulation in winter and summer up to 25 km is schematically shown by a ridional section. Author describes a weak but permanent "tropopause circulation," polewards in er stratosphere, equatorwards below. Finally, the dynamics and kinematics of polar front ability and the bearing of the author's ideas on weather forecasting are considered. (*Same item* 3.3–110, March 1952, *Met. Abs.*) *Subject Headings:* **1. Atmospheric circulation 2. Planetary culation 3. Tropopause.**—*C.E.P.B.*

12I–26 551.511:551.513.1

Raethjen, Paul, **Über den zweidimensionalen Impulsaustausch rotierender Systeme.** [On two-dimensional exchange of rotating systems.) *Archiv für Meteorologie, Geophysik und Bio- matologie, Ser. A*, 3(3/4):173–228, **1951.** 5 figs., 3 tables, 138 eqs., 15 refs. German, English and nch summaries p. 173–175. **DLC**—This difficult mathematical discussion of mass exchange ins with a series of definitions. Owing to the unequal supply of heat, mostly by insolation, hange is not equal in all directions but takes place mainly along a "preferred axis" which in the netary exchange is N–S. This is elaborated in Pt. II on the assumption that the air mass moves as hole, either horizontally or with a vertical gliding component. In Pt. III this is modified by the oduction of "exchange gradient winds" and a "coefficient of monotrophy" is defined. "Geo- phic winds" are regarded as austausch motions of the atmosphere. Pt. IV considers large scale tical exchange; in the absence of friction air masses moving rapidly N or S retain nearly constant ticity. Finally, Pt. V discusses the planetary circulation from the point of view of two-dimen- nal exchange. Taking account of surface friction, the planetary austausch at 250 gdm is calculated l a model meridional section up to 25 km is constructed. The findings are related to the planetary st winds and other features. (*Same item as* 2.10–67, Oct. 1951, *Met. Abs.*) *Subject Headings:* **Planetary circulation 2. Energy exchange.**—*C.E.P.B.*

12I–27 551.510.41:523.4

Strughold, Hubertus (*Dept. of Space Medicine*), **Comparative ecological study of the chemistry the planetary atmospheres.** *U. S. School of Aviation Medicine, Randolph Field, Texas, Special port* [unnumbered.] March **1951,** reprinted in its **Epitome of space medicine.** Article No. 8. p.) 4 tables, 34 refs.—The chemical composition of the present atmosphere of the earth and the mical characteristics of the earth's atmosphere during its development are surveyed. This is owed by a discussion of the chemical composition of the planetary atmosphere in the order of the reasing distance of the planets from the Sun. Tables giving the main components of the terrestrial nosphere and protoatmosphere in order of abundance, the components of the planetary atmos- eres, ecological types of atmospheres of the planetary system and the main components of planetary nospheres in terms of their molecular weight are presented. *Subject Headings:* **1. Chemical nposition of planets 2. Planetary atmospheric composition.**—*I.L.D.*

1952

12I–28 551.521.18:523.4

†Adel, Arthur (*Arizona State College, Flagstaff*), **Selected topics in the infrared spectroscopy of solar system.** (In: Kuiper, G. P., ed., **The atmospheres of the earth and planets.** Rev. ed. ic., Univ. of Chicago Press, **1952.** p. 267–283. 2 tables, figs., 44 refs.) **DWB, DLC** (QB505.K8) This paper covers several of the numerous problems of astrophysical interest in the solar system

which are amenable to solution through the methods of infrared spectroscopy. Interest is primarily in the bolometric region of the spectrum, secondarily in the photographic region. The following topics are covered regarding the earth and the other planets: atmospheric phenomena, composition temperature and surface phenomena. Other topics discussed briefly: atmospheric transmission and the temperature of the sun, atomic lines in the far infrared, and non-Rayleigh scattering o infrared solar spectrum of the earth's atmosphere. *Subject Headings:* **1. Spectroscopic study o planetary atmospheres 2. Infrared spectrum of atmosphere.**—*A.J.M.*

12I–29 523.03(02) 523.035.31

†Ambartsumian, Viktor Amazaspovich (*ed.*), **Teoretičheskaia astrofizika.** [Theoretical astro physics.] Moscow, Gosud. Izdat. Tekhniko-Teoreticheskoĭ Literatury, **1952.** 635 p. 75 figs 36 tables, 81 refs., numerous eqs. **DLC** (QB461.A58). *Also:* Transl. into English by J. B. Sykes N. Y., Pergamon Press, **1958.** 645 p. 75 figs., 36 tables, 183 refs., numerous eqs. Index of names p. 636–638 with variant transliterations of Russian names. **DLC** (QB461.A583)—In chapt. VII the scattering of light in planetary atmospheres is discussed. The planets Venus, Jupiter and Saturn and also apparently Uranus and Neptune are surrounded by atmospheres so dense that we do not se the surface of the planets. The radiation reaching us from these planets is the Sun's radiatio scattered by their atmosphere. Since the atmospheres of these planets are opaque, there is a proba bility of undergoing, before leaving the atmosphere, not one but many scattering processes. Th problem of the multiple scattering of light in planetary atmospheres is solved by the study of radiativ transfer. The principle of invariance and its application and the albedo of a planetary atmosphe are discussed in detail. A comparison of theoretical calculations with observations is presente (For abstract of entire book, *see* item 11B–3, *Met. Abs.*) *Subject Headings:* **1. Astrophysics tex books 2. Planetary albedo 3. Radiative transfer.**—*E.K.*

12I–30 551.510.41:523

Buscombe, William (*Mt. Wilson and Palomar Obs.*), **Planetary atmospheres.** Summary of a illustrated Alexander F. Morrison lecture given at San Diego State College, Feb. 29, 1952. *Astr nomical Society of the Pacific, San Francisco, Leaflet,* No. 277, May **1952.** 8 p. table. **DLC-** Current knowledge on planetary atmospheres is summed up by brief comments on each planet. table of planetary escape velocities, surface temperatures and chemical composition of atmosphere based on Sir James Jean's computations and on spectroscopic measurement, is presented. (*San item as* 5.5–77, May 1954, *Met. Abs.*) *Subject Heading:* **1. Planetary atmospheres.**—*G.T.*

12I–31 523.4:535.

†Dunham, Theodore, Jr. (*Rochester Univ.*), **Spectroscopic observations of the planets at Mou Wilson.** (In: Kuiper, G. P. ed., **The atmospheres of the earth and planets.** Rev. ed. Chicag Univ. of Chic. Press, **1952.** p. 286–303. figs., 22 refs.) **DWB**—The spectra of Mercury, Ma Venus, Jupiter, Saturn, Uranus and Neptune are discussed. Experimental evidence tends to sho that oxygen in a planetary atmosphere can be detected with a spectroscope, and it seems safe to inf that since no lines due to oxygen can be detected in the spectra of Venus and Mars, the gas is almos if not entirely, absent from the atmosphere of these planets. The Coudé spectrograph with 100-in telescope is sketched. (For abstract on first ed. *see* 3B–200, *Met. Abs.*) *Subject Headings:* **1. Spect of planetary atmospheres 2. Oxygen in planetary atmospheres.**—*E.Z.S.*

12I–32 551.510.41:523

†Flagstaff, Arizona. Lowell Observatory. **The study of planetary atmospheres.** Contra AF 19(122)–162, Final Report, Sept. 30, **1952.** 289 p. tables, graphs, refs. throughout, e **DWB**—Since Lowell Observatory had 50 years of photographs of the surfaces of the planets to use "Weather Maps" for a study of their day-to-day circulation, a project to study the atmospheres planets (Mars and Jupiter, Venus and Saturn) was begun at Lowell Observatory under contract wi the U. S. Weather Bureau in 1948. Since 1949 it has been sponsored by the Geophysics Resear Directorate of the U. S. Air Force. The similarities of the circulations of the planets to those of t earth were thought to be of value in studying the general circulation of the latter planet. A numb of papers by Hess, Mintz, Lorenz, Blackadar and others are included. A long summary of the resu and conclusions arranged by planets (Mars, Venus, Jupiter and Saturn) appears on p. 274–2 (*Same item as* 5.5–79, *Met. Abs.*) *Subject Heading:* **1. Planetary meteorology.**—*M.R.*

12I–33 551.515.8:551.5

Fultz, Dave, **On the possibility of experimental models of the polar-front wave.** *Journal Meteorology,* 9(6):379–384, Dec. **1952.** 6 figs., 6 refs. Also: Chicago University. Dept. of Me orology, Contract AF 19(122)-160, Scientific Report No. 4, **(1953).** **DWB**—Describes and illustra model experiments in which polar-front type perturbations, cyclones and jets such as appear on up

vel synoptic charts appeared; 1) two homogeneous immiscible liquids in a rotating circular disk, water in a rotating pan heated at outer edge and cooled at "pole." Similarities to atmosphere markably close. (*Same item as* 4.11–131, Nov. 1953, *Met. Abs.*) *Subject Headings:* **1. Polar fronts Planetary circulation.**—*C.E.P.B.*

12I–34 551.510.53

Gerson, Nathaniel C., **The terrestrial atmosphere.** *Science Progress*, London, 40(158):245–254, pril **1952.** fig., 7 tables. **DWB**—The atmosphere is divided into troposphere, stratosphere, emosphere, ionosphere, mesosphere and exosphere by surfaces (in lat. 45°) at 11, 32, 80 and 400 km. xt and tables summarize composition and photochemistry, temperature, pressure, density and free th at different levels, height and electron density of ionic layers D–G. Brief accounts are given of rora, night and twilight airglow, and dynamics of ionosphere and mesosphere. (*Same item as* 7–77, July 1952, *Met. Abs.*) *Subject Headings:* **1. Light of the night sky 2. Atmospheric structure Auroras 4. Ionosphere.**—*C.E.P.B.*

12I–35 551.521.3:535.34

†Herzberg, G. (*Div. of Physics, Nat. Research Council of Canada*), **Laboratory absorption spectra btained with long paths.** (In: Kuiper, G. P., ed., **The atmospheres of the earth and planets.** ev. ed. Chic., Univ. of Chicago Press, **1952.** p. 406–416. fig., table, 21 refs.) **DWB, DLC** QB505.K8)—The interpretation of planetary spectra requires the production of corresponding osorption spectra in the laboratory under as nearly similar conditions as possible. Previous aboratory work utilized high pressures (up to 50 atm) combined with a moderately long path (up 45 m) in order to obtain absorption intensities comparable to those in planetary atmospheres. arge discrepancies in estimates of various atmospheric constituents made from laboratory experi- ents are blamed on pressure broadening, a phenomenon which obliterates the fine structure of the osorption bands thus making a comparison of the intensity distribution within the fine structure npossible. Evidently, laboratory experiments are needed using much lower pressures, on the order 1 atm for example, and in which, therefore, much longer paths are required. For this reason, a ng optical path was set up at Yerkes Observatory which allows use of path-lengths up to 5500 m. he apparatus is described and the spectrum of oxygen, CO_2, and the quadrupole spectrum of H_2 are scussed. Two brief notes containing additional experimental information are appended. *Subject eadings:* **1. Absorption spectra 2. Planetary spectra.**—*A.J.M.*

12I–36 551.5:523.2 551.507.362.1

Kuiper, Gerard Peter (ed.), **The atmospheres of the earth and planets.** Rev. ed. Chic., Univ. Chicago Press, **1952.** 434 p. 93 figs., 16 plates, tables, refs., bibliogs., eqs. "Papers originally resented at the **Symposium on Planetary Atmospheres, Univ. of Chicago, Sept. 8–10, 1947."** (For bstract on the first edition (1949), *see* 10–4, Oct. 1950, *Met. Abs.*) **DWB, DLC** (QB505.K8 1952)—he first edition of this excellent collection of articles on planetary atmospheres (published in 1949) ontained one chapter by J. FRANCK which was deleted in the second edition by the editor, who added ome new data in support of photosynthesis on Mars in his chapter on the **Origin of planetary atmos- heres** (Ch. XII, p. 306–405, *see item* 12I–37). Several other chapters have been revised and enlarged o include new data on night sky and auroral spectra, rocket investigations, etc. The 14 chapters ange in subject matter from **The general circulation of the Earth's atmosphere** (C.-G. ROSSBY), **cattering in planetary atmospheres** (H. C. VAN DE HULST, *see item* 12I–42), **Density of upper atmos- here** (F. L. WHIPPLE et al., 12E–54, *Met. Abs.*), **Atmosphere above 300 km** (L. SPITZER, JR.), **volution of earth's atmosphere** (R. T. CHAMBERLIN), **Rare gases** (H. BROWN), **Infrared spectroscopy** A. ADEL [12I–28] and M. V. MIGEOTTE), **Spectroscopy of planets at Mt. Wilson** (THEODORE DUNHAM, JR., *see item* 12I–31), and **Laboratory absorption spectra with long paths** (G. HERZBERG, ee *item* 12I–35). Appended are data and a model of the upper atmosphere, and numerous spectro- rams (*Same item as* 4.6–6, June 1953; and 11A–62, Jan. 1960, *Met. Abs.*) *Subject Headings:* **. Planetary atmospheres 2. Rocket research 3. Photosynthesis on Mars 4. Upper atmosphere ensities.**—*M.R.*

12I–37 551.510.41:523.43

†Kuiper, Gerard Peter (*Yerkes Obs., Chicago Univ.*), **Planetary atmospheres and their origin.** In: Kuiper, G. P. (ed.), **The atmospheres of the earth and planets.** Rev. ed. Chicago, Univ. of Chicago Press, **1952.** p. 306–405. figs., 10 tables, numerous refs., eqs.) **DWB**—The author iscusses the restrictions put on the presence of planetary atmospheres by the velocity of escape, the omposition and origin of the earth's atmosphere, the escape of the protoatmosphere, the origin and xpected composition of planetary atmospheres, the structure of planetary atmospheres and the roblems of the atmosphere of the planet Mars. (*Same item as* 5.5–80, May 1954, *Met. Abs.*) *Subject Headings:* **1. Planetary atmospheres 2. Mars.**—*I.L.D.*

12I–38 551.5(02) 550.3(02) 52(02)

†*Landolt, Hans H. and Börnstein, Richard, **Zahlenwerte und Funktionen aus Physik, Chemie, Astronomie, Geophysik und Technik.** [Tables and equations in physics, chemistry, astronomy, geophysics and technology.] 6th ed. Edited by Arnold Eucken. Berlin, Springer, **1950–52.** Vol. 3, **Astronomie und Geophysik.** Issued **1952.** Prepared by Georg Joos; ed. by Julius Bartels and Paul ten Brüggencate. 795 p. figs., tables, charts, bibliogs. **DWB, DLC** (QC61.L3)—Next to the **Compendium of Meteorology,** this volume of LANDOLT-BÖRNSTEIN is the most comprehensive undertaking in meteorological publication of the decade. It would be impossible to review in detail all of the vast amount of physical data from all parts of the earth, as well as empirical data, which are useful in theoretical calculations of the earth, sea, atmosphere, sun, moon or planets which have been included. In the section on **Astronomy,** a sub-section by H. SIEDENTOPF (p. 30–34), deals with data on the astronomical influence of the earth's atmosphere (astronomic refraction, extinction by gases and by haze in various wave lengths, scintillation and twilight or night sky luminescence). Another sub-section (p. 58–59) deals with planetary atmospheres and their composition (including the earth). One by WALDMEIER (p. 60–76) covers the solar atmosphere: sunspots, faculae, chromosphere eruptions and protuberances, corona, the 11-year sunspot cycle and solar activity (including a table of monthly and annual relative sunspot numbers 1749–1950), and magnetic field of the sun. The next section gives data on planets, the moon and asteroids or planetoids, temperature, albedo of planets, meteorites, heat radiation from planets, etc. The section on **Geophysics** contains sections on gravity, geodesy, tides, minerals, rocks, seismology, magnetism of the earth, and temperature of the earth's interior. (*Same item as* 4.4–9 and 11A–2, *Met. Abstracts.*) *Subject Headings:* **1. Astrophysical tables 2. Planetary atmospheric composition 3. Planets I. Eucken, Arnold (ed.) II. Joos, Georg (ed.) III. Bartels, Julius (ed.) IV. ten Brüggencate, Paul (ed.).**—*M.R.*

12I–39 551.5(02) 551.510:551.521

Roulleau, Jean and Trochon, R., **Météorologie générale, tome 1; Structure verticale de l'atmosphère. L'atmosphère et les phénomènes de rayonnement.** [General meteorology, Vol. 1, Vertical structure of the atmosphere. The atmosphere and the phenomena of radiation.] Paris, Gauthier-Villars, **1952.** 149 p. 47 tables, 46 figs., eqs., bibliography p. 143–145. (*Monographies de Météorologie* [unnumbered].) **Vol. 2,** Paris, Gauthier-Villars, **1958.** 178 p. 84 figs., 77 tables, numerous eqs., bibliography p. 171–173. (*Monographies de Météorologie* [unnumbered]). **DWB.**—Without going too much into theoretical detail, the authors present a textbook acquainting the student mainly with the observational basis of meteorology, discussing vertical, diurnal and seasonal variations of meteorological elements, including ozone, carbon dioxide and nuclei. A new feature, usually missed in similar books, is numerous graphs and data, showing the frequency distribution of temperature and its lapse rate, as well as of pressure, humidity and of the standard atmosphere from the earth's surface up to the stratosphere. The second part of Vol. 1 deals with solar radiation, its diffusion and selective absorption, earth's and atmospheric long wave radiation (diagrams of Elsasser and Kew) and with the influence of nuclei on radiation phenomena. Furthermore, the radiation balance of the system earth-atmosphere, of the soil, the troposphere and the stratosphere are described, giving the basic formulas and numerical data. Vol. 2 consists of 9 chapters which cover: 6) Thermodynamic transformations in the atmosphere; 7) Starting and maintenance of vertical motions. Vertical stability and instability; 8) Equations of atmospheric motions; 9) Motion, in steady state, in the free atmosphere; 10) Atmospheric turbulence; 11) Condensation of atmospheric water vapor; 12) Clouds and fogs; 13) Constitution of clouds and fogs; 14) Precipitation. (*Same item as* 5.4–3 and 10.2–1, *Met. Abs.*) *Subject Headings:* **1. Meteorology textbooks 2. Atmospheric structure 3. Radiation 4. Atmospheric turbulence 5. Cloud physics.**—*A.A. and A.V.*

12I–40 551.510:525.7:523.4

Sharonov, Vsevolod Vasil'evich, **Vozdushnyĭ okean Zemli i planet.** [The air ocean of the Earth and the planets.] Leningrad, **1952.** 28 p. 3 figs., 2 tables. At head of t-p. Vsesoiuznoe Obshchestvo po Rasprostraneniiu Politicheskikh i Nauchnykh Znanii Leningradskoe Otdelenie; **DLC** (QB603.S5)—A popular lecture on our atmosphere: its color, structure and composition, as well as on the atmospheres of Venus and Mars. The Jupiter group of planets, composed entirely of frozen methane and ammonia gases, is described. *Subject Headings:* **1. Atmospheric structure 2. Planetary atmospheres.**—*S. Nowinska.*

12I–41 523.3

Urey, Harold Clayton, **The planets; their origin and development.** New Haven, Yale Univ. Press, **1952.** 245 p. 16 figs., 19 tables, foot-refs., eqs. **DLC** (QB361.U7)—A fairly detailed technical treatment of the following subjects: origin of solar system; the moon; terrestrial planets; chemical processes during planet formation; heat balance of the earth; and abundances of the elements

d the chemical composition of the solar system. The chapters on the moon and planets cover mosphere, origin, heat balance, composition, etc. This book requires some knowledge of chemistry, tronomy and mathematics to be fully utilized. Tables and numerous equations accompany the xt. *Subject Headings:* **1. Solar system 2. Planets 3. Moon.**—*A.J.M.*

12I–42 551.521.3

†van de Hulst, H. C. (*Univ. Obs., Leiden, Netherlands*), **Scattering in the atmospheres of earth d the planets.** (In: Kuiper, G. P. (*ed.*), **The atmospheres of the earth and planets.** Rev. ed. icago, Univ. of Chicago Press, **1952.** p. 49–111. figs., tables, 129 refs., eqs.) This chapter by AN DE HULST is unchanged from 1949 ed. **DWB**—Many aspects of scattering by atmospheres are scussed. Methods of measuring extinction coefficients are followed by extinction of molecules and articles as a function of wavelength and particle size. Scattering by clouds is not discussed much, cept for reflection at grazing incidence. The daylight sky as related to scattering is discussed and e requirements for good measurements to test theory are itemized. Polarization, twilight phe- omena, eclipses of the moon, determination of emission layers are discussed. The scattering by tmospheres follows the formation of absorption lines, and the polarization of planets is reviewed. (*Same item as* 10–89 and 8G–105, *Met. Abs.*) *Subject Headings:* **1. Scattering of light 2. Polarization planets 3. Atmospheric absorption 4. Albedo.**—*S.F.*

1953

12I–43 523.22:551.510.4:551.1

Landsberg, Helmut E., **The origin of the atmosphere.** *Scientific American*, 189(2):82–86, Aug. **953.** diagrs. **DWB**—Present composition of the earth's atmosphere is described. Escape locities for different gases under various temperatures are discussed and the evolution of the atmos- here is deduced from changes in the escape of atmospheric constituents due to the cooling of the rth. Four hypothetical stages of the atmosphere are described and illustrated by colored schematic agrams. Three hypotheses on the origin of oxygen (by thermal dissociation, photochemical sociation or photosynthesis of carbon dioxide in plants) are mentioned and the presence of argon is plained. The atmosphere of Mars, which appears to represent a later stage of development is ggested as a possible clue for predictions regarding future evolution of the terrestrial atmosphere. he effect of human, especially industrial activities and its compensation by nature is considered. (*Same item as* 5.1–102, Jan. 1954, *Met. Abs.*) *Subject Headings:* **1. Origin of atmosphere 2. Atmos- heric evolution 3. Atmospheric composition.**—*G.T.*

12I–44 551.58:523.4:523.07

Tikhov, G. A., **Vozmozhna li zhizn' v drugikh mirakh (Astrobiologiia).** [Is life possible in other orlds? (Astrobiology).] *Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy*, 1:3–17, **953.** Kazakh summary p. 17. **DLC** (QK1.A35866). Also his: **Is life possible on other planets?** *ritish Astronomical Association, Journal*, 65(5):193–204, April **1955. DLC**—Physical conditions on Mars (mean temperature −23°C, mean temperature of warmest place −8°, pressure 37 mm Hg, etc.), n Venus (temperatures up to 80°C or more) and on other planets are described and arguments are dvanced to show that planet life is possible on Mars and Venus, and micro-organisms may even xist on the giant planets. The existence of plant life on Mars is stated to have been definitely stablished. (*Same item as* 7.2–237, *Met. Abs.*) *Subject Heading:* **1. Life on planets.**—*G.T.*

12I–45 551.510.41:523.4 551.513

White, Robert M. (*ed.*), **Contributions to the study of planetary atmospheric circulations.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 24; *Technical Report*, 3-35, Nov. **1953.** 141 p. 29 figs., tables, refs., eqs. **DLC, DWB**—This volume consists of 12 apers on various aspects of the general circulation of theoretical atmospheres or of the atmosphere f the Earth or of Jupiter, and of laboratory model studies of planetary circulations. The separate rticles (all dated 1953) were abstracted and published in *Met. Abs.* under the names of the authors: . P. STARR, E. N. LORENZ, H. L. KUO, R. H. BATTIN, R. M. WHITE, G. S. BENTON and N. E. LA EUR, Y. MINTZ and S. K. KAO, STARR and LONG, R. SHAPIRO and E. W. WAHL. All work was done nder the sponsorship of G. R. D. and its atmospheric analysis laboratory. (*Same item as* 6.3–94 *Met. Abs.*) *Subject Headings:* **1. Planetary atmospheres 2. General circulation 3. Angular omentum flux 4. Eddy transport 5. Compendiums.**—*M.R.*

1954

12I–46 551.510.52/3

†Byers, Horace R. (*Dept. Met., Univ. of Chic.*), **The atmosphere up to 30 kilometers.** (In: Kuiper, Gerard P. (*ed.*), **The earth as a planet.** Chicago, Univ. of Chic. Press, **1954.** p. 299–370.

32 figs. (incl. photos), 5 tables, bibliog. p. 367–370). **DLC** (QB501.K75)—The atmosphere below the stratopause (i.e., the troposphere and stratosphere) is discussed in 7 separate sections: 1) composition and heat or radiation balance; 2) temp. distribution (vertical and aperiodic); 3) atmos. circulation (general circulation, dishpan models, the jet stream, meridional and zonal flow, the Palmén model, etc.); 4) secondary circulations (upper waves, cyclones, convergence zones); 5) tropical cyclones and tropical weather (minor tropical storms, hurricanes and typhoons, the "eye," precip. bands, radar photos, etc.); 6) atmospheric electricity; 7) condensation and precip. (*Same item as* 7I–146 and 10.7–184, *Met. Abs.*) *Subject Heading:* **1. Atmospheric structure.**—*M.R.*

12I–47 523.22:551.521.14

*†Danjon, André (*Dir., Obs. de Paris*), **Albedo, color, and polarization of the earth.** (In: Kuiper, Gerard P. (*ed.*), **The earth as a planet.** Chicago, Univ. of Chicago Press, **1954.** p. 726–738. 4 figs., table, 23 refs., eqs.) **DLC**—The visual albedo of the earth as determined from earthshine varies with the seasons from 0.52 (Oct.) to 0.32 (July) with an average value of 0.40. Variations in cloudiness may account for most of the seasonal variations. Fritz reports that albedo of clouds alone is about 0.5, which is in keeping with maximum value given above. Fritz also states that French estimates by Danjon did not consider the vast area of the Pacific, nor latitudinal variations in cloudiness. According to Danjon, colorimetric observations of the earth light show it to be bluish, but it changes seasonally and also there are random changes. The brighter the earth light, the bluer it is, except for the random changes, which occur a few days before full moon (from France) and are probably due to reflection from the Atlantic Ocean area. Polarization varies over land, sea and clouds. Resulting polarization for phase angle of 90° is about 36% but varies with phase. Comparison is made with the parallel conditions in Mercury, Venus and the Moon. (*Same item as* 8G–123 *Met. Abs.*) *Subject Headings:* **1. Albedo of earth 2. Earth shine 3. Color of earth shine 4. Polarization of earth shine.**—*M.R.*

12I–48 551.510.41:551.521.3:535.34

†Goldberg, Leo (*Dir., Univ. of Mich. Obs.*), **Absorption spectrum of the atmosphere.** (In: Kuiper, Gerard P., *ed.*, **The earth as a planet.** Chicago. Univ. of Chicago Press, **1954.** p. 434–490 19 figs., 5 tables, 490 eqs., bibliog. p. 483–490.) **DLC**—The absorption spectra (both discrete and continuous) in all wave lengths, for all of the atmospheric constituents (N_2, O_2, O_3, N_2O, CO, CH_4, H_2O, etc.) are taken up for each major spectral region, i.e., (1) 0–0.3μ(O_3, O_2, N_2, O, N) with discussion of transparency at high altitudes and with numerical values of abundance of elements, and sample spectrophotographs; (2) 0.3 to 24μ divided into 0.3 to 1.3μ, 1.4–2.5μ, 2.9–5.5μ, 7–13μ and 15–24μ and (3) mm and cm wave lengths. Line spectra and line absorption coefficients, abundances of gases, vertical distribution, especially of H_2O, CO_2 and CH_4; band-width, pressure and temperature effects and, finally, recent findings from rocket and laboratory experiments are discussed. (*Same item as* 10F–4, *Met. Abs.*) *Subject Headings:* **1. Absorption spectra 2. Atmospheric composition** —*M.R.*

12I–49 551.501.7:551.507.362:778.3

Holliday, Clyde T. (*Johns Hopkins Univ.*), **The earth as seen from outside the atmosphere** (In: Kuiper, Gerard P. (*ed.*), **The earth as a planet.** Chicago. Univ. of Chicago Press, 1954 p. 713–725. 8 figs. (incl. photos), 14 refs.) **DLC**—The first successful aerial photographs were made in 1856 by M. Nadar from a captive balloon over Paris. In Oct. 1946 the earth was first photographed from a height that gave a clear picture of the earth as it would look from outside the atmosphere (V-2, No. 13 at White Sands, N. Mex.). Purpose of high altitude photography is to determine orientation of the rocket in flight to obtain meteorological and astrophysical data, and to conduct photographic reconnaissance. Usually 16 or 35 mm movie cameras or 10×12.7 cm aerial reconnaissance camera are used. Over 1000 successful photos have been obtained (96% recovery of cameras and 98% satisfactory film). Meteorologists can derive useful information on climatic or seasonal changes in earth's cover, cloud formations on a large scale, orographic effects on cloudiness, cloud streets, albedo, etc. (*Same item as* 8.3–94, March 1957, *Met. Abs.*) *Subject Headings:* **1. Rocket photography 2. Aerial photography 3. Rocket photo-reconnaissance 4. Earth photography from outer atmosphere.**—*M.R.*

12I–50 551.510.41:523.

†Hutchinson, G. E. (*Yale Univ.*), **Biochemistry of the terrestrial atmosphere.** (In: Kuiper Gerard, P., ed., **The earth as a planet.** Chic., Univ. of Chic. Press, **1954.** p. 371–433. fig., tables bibliog. p. 427–433, eqs.) **DLC** (QB501.K75)—Atmospheric origin, composition and the chemical processes connected with CO_2, methane, O_2, N_2, NH_4, N_2O, NO_2, Cl, Br, I, SO_2, etc., composition of Venus, Mars and other planets are all dealt with in great detail from the chemical as well as the meteorological point of view. Extensive tabular data extracted from the voluminous literature

cluded. Biological processes involved or affected by these constituents are amply treated. *Subject eadings:* **1. Atmospheric chemistry 2. Atmospheric composition 3. Planetary atmosphere omposition.**—*M.R.*

12I–51 551.510.5

†Kuiper, Gerard P. (*ed.*), **The earth as a planet.** Chicago, Univ. of Chic. Press, **1954.** 751 p. s., photos, tables, bibliogs. throughout. **DLC**—The 15 articles collected and arranged in a logical der in this second volume of an astrophysical compendium cover the dynamics of the earth as a anet, the structure of the earth's interior, the earth's crust, mountains, etc., the oceans, geo- emistry, upper atmosphere, biochemistry and the properties of the upper atmosphere that would d in studies of other planets or stars by analogy. For articles pertinent to this bibliography *see* ems 12I–46 to –50, –53 and –56. (*Same item as* 7.11–4, Nov. 1956 and 11A–64, *Met. Abs.*) *Subject eadings:* **1. Earth as a planet 2. Upper atmosphere physics.**—*M.R.*

12I–52 523.4

†Moore, Patrick, **Guide to the planets.** N. Y., W. W. Norton, **1954,** 1st ed.; **1960.** Rev. ed. 54 p. 32 figs., plates, refs., p. 237–238. **DLC.** Review by H. Spencer Jones, in *Endeavour,* ondon, 14(55): 160, July **1955. DLC**—A companion volume to the author's **Guide to the moon** N. Y., Norton & Co., **1953**), this book is a guide for observation of Mercury, Venus, Moon, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto, each of which is described in a separate chapter. he minor planets, the wandering stars, life on the planets, voyages to the planets, birth of the planets, e discussed in other chapters. Data on the planets are tabulated in an appendix and planetary ocieties, planetary literature and amateur observing suggestions in other appendices. The atmos- here of each of the planets is discussed briefly in the proper places in each chapter. *Subject Heading:* **. Planets.**—*M.R.*

12I–53 551.510.53:551.510.4

†Nicolet, M. (*Royal Met. Inst., Brussels*), **Dynamic effect in the high atmosphere.** (In: Kuiper, erard P. (*ed.*), **The earth as a planet.** Chic., Univ. of Chic. Press, **1954.** p. 644–712. 13 figs., ibliog. p. 707–712, 130 eqs.) **DLC**—The chemistry and physics of the upper atmosphere are onsidered from the point of view of diffusion, absorption of radiation, and thermal or radiative quilibriums of O_3, O_2, N_2, NO_2, N_2O, and OH; and atmospheric movements (winds) as deduced from hotography or spectroscopy of the aurora, meteors, airglow, and noctilucent clouds; ionospheric ides and winds; meteors and radio astronomy. (*Same item as* 8.5–171, *Met. Abs.*) *Subject Head- ngs:* **1. Upper atmosphere physics 2. Upper atmosphere structure 3. Diffusion in upper atmos- here 4. Upper atmosphere composition.**—*M.R.*

12I–54 551.5:522(02)

†Skilling, William Thompson (*San Diego, State College, ret'd*) and Richardson, Robert S. (*Mt. Wilson and Palomar Observatories*), **Brief text in astronomy.** New York, Henry Holt, **1954.** 327 p. gs., tables, photos, charts, bibliog. p. 289–290. **DLC**—This elementary but up-to-date text on stronomy contains many sections which touch on meteorology or climatology. The atmosphere composition, refraction, twinkling and geomagnetism) is discussed on p. 34–37; meteorites, zodiacal ight, counterglow on p. 45–50; time and seasons, p. 59–75; moon's temperature and atmosphere, . 99–103; eclipses p. 113–120; the solar atmosphere, solar and terrestrial relations, radio astronomy, . 126–153; planetary atmospheres, albedo, surface temperature, etc. p. 154–186; and meteors, . 197–204. The text is well illustrated and has a good index and glossary of astronomical terms. *Same item as* 6.11–8, *Met. Abs.*) *Subject Headings:* **1. Astronomic meteorology 2. Astrophysics 3. Planetary atmospheres 4. Textbooks.**—*M.R.*

12I–55 551.501.3:53.081.7

Smithsonian Institution, **Smithsonian physical tables.** 9th rev. ed. prepared by William Elmer Forsythe. *Smithsonian Miscellaneous Collections,* Vol. 120, **1954.** 827 p. 901 tables. **DWB, DLC** —Considering the comprehensiveness of the **Smithsonian Meteorological Tables** (*see* 2D–35, April 1951, *Met. Abs.*) it is at first glance hard to see how these Physical Tables could have much value for a meteorologist. But on closer scrutiny it can be seen that such tables as those on black body radia- ion energy, photometry, thermodynamics, thermal properties of gases, acoustics, optics, aeronautics standard atmosphere, airflow, etc.), diffusion, vapor pressure, surface tension, radio propagation, onosphere, transmission of radiation, spectroscopy, atmospheric electricity, nuclear physics, cosmic ays, X-rays, solar radiation, astrophysics, oceanography and earth temperatures, to name only a ew categories of the wealth of subject matter contained in the 901 tables of this 9th rev. ed., are of extreme value for the physical or practical meteorologist or astrophysicist. (*Same item as* 6.1–6, Jan. 1955, *Met. Abs.*) *Subject Headings:* **1. Astrophysical tables 2. Physical constants 3. Physical meteorology. I. Forsythe, William Elmer.**—*M.R.*

12I–56 551.506.7:551.507.362

Whipple, Fred L. (*Harvard Col. Obs.*), **Density, pressure and temperature data above 30 kilometers.** (In: Kuiper, Gerard P., ed., **The earth as a planet.** Chicago. Univ. of Chicago Press, **1954.** p. 491–513. 7 figs., 3 tables, 19 refs.) **DLC** (QB501.K75)—A complete summary of results of recent observations of upper atmosphere pressure, density and temperature, as obtained from rocket firings. Earlier work is not reviewed. Diurnal, seasonal and latitudinal variations are discussed, and the chief results tabulated by 2, 5 or 10 km levels up to 219 km, and shown on graphs (to 160 km). Meteor and sound propagation data are also considered briefly. (*Same item as* 9.2–153, Feb. 1958, *Met. Abs.*) *Subject Headings:* **1. Upper air data 2. Rocket data 3. Atmospheric structure.**—*M.R.*

12I–57 551.510.41:523.4

Wurm, K. (*Sternwarte Hamburg-Bergedorf*), **Welche Elemente sind in den Planetenatmosphären nachgewiesen?** [Which elements have been found in the planetary atmospheres?] *Umschau* 54(6):172–173, March 15, **1954.** 2 figs., 2 refs. **DWB**—A brief description of composition of earth's outer atmosphere is given. Infrared spectrum of planets shows powerful absorption by CO_2 on Venus and less powerful on Mars; proportion of O_2 and H_2O is less than 2% that on earth but polar caps of Mars are ice. The large outer planets have methane (CH_4), especially on Uranus and Neptune and ammonia (NH_3), especially on Jupiter, both probably liquid or solid. Water vapor is present, and probably H_2 on Uranus and Neptune. (*Same item as* 6.2–99, *Met. Abs.*) *Subject Heading:* **1. Planetary atmosphere composition.**—*C.E.P.B.*

12I–58 551.510.41:523.4

Zerinváry, Szilárd, **A bolygók légköre.** [Planetary atmospheres.] *Időjárás*, Budapest, 58(1) 44–55, Jan./Feb. **1954.** 2 figs. Russian and French summaries p. 44.—Review of latest findings in astrometeorology. Physical properties identified so far are discussed for each planet separately. (*Same item as* 6.2–100, *Met. Abs.*) *Subject Heading:* **1. Planetary atmospheres.**—*G.T.*

1955

12I–59 551.510:523.4

Kastov, V. G., **Atmosfery planet.** [Atmospheres of the planets.] *Meteorologiia i Gidrologiia* Leningrad, No. 1:58–60, Jan./Feb. **1955.** 4 refs. **DWB**—A nontechnical summary of the characteristics of the atmospheres of the planets of the solar system, of the contributions of Russian scientists to the knowledge of planetary atmospheres and of the means for studying these atmospheres. *Subject Headings:* **1. Planetary atmospheres 2. Progress in planetary science.**—*I.L.D.*

12I–60 523.164.3:621.396.8

Ovenden, Michael, W., **Some recent planetary investigations.** *Science Progress*, London 43(172):648–654, Oct. **1955. DWB**—1. Markings on Mars may be due to vegetation adapted to its extreme climate. An alternative explanation is that they are dust, probably volcanic, carried by the permanent wind systems. 2. Radio emission bursts from Jupiter on 22 Mc/s are probably due to thunderstorms with rare but intense lightning flashes. 3. Magnetic storms on Venus are attributed to solar corpuscular streams. (*Same item as* 11.9–87, *Met. Abs.*) *Subject Headings:* **1. Mars 2. Radio emission from Jupiter 3. Magnetic storms on Venus.**—*C.E.P.B.*

12I–61 522.1:523.4

Sharonov, V. V., **Ocherednye zadachi astronomicheskikh issledovanii Marsa i drugikh planet** [The next tasks in the astronomical investigation of Mars and other planets.] *Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy*, 4:55–61, **1955.** 2 foot refs. **DLC** (QK.A35866)—The author outlines the immediate tasks a planetary institute, perhaps to be established in the future, could most fruitfully undertake in the fields of research (planetary photography, lunar and planetary cartography, spectrophotometry and polarimetry of asteroids, surface photometry and colorimetry, spectroscopy, radiometry and radioastronomy), laboratory studies (reflectivity of solids, gases and aerosol, spectroscopy and thermal investigations) and theoretical work (statics, dynamics, optics and chemistry of planetary atmospheres, climatology and interior structure of planets). The urgency of establishing an institute which could undertake these studies is stressed. *Subject Heading:* **1. Planetary research institutes.**—*G.T.*

1956

12I–62 551.511.33:551.521

King, Jean I. F. (*Geophysics Res. Directorate, A. F. Cambridge Res. Center*), **The radiative heat transfer of planet earth.** (In: Van Allen, James A. (*ed.*), **Scientific uses of earth satellites.** Ann

bor, Univ. of Michigan Press, **1956.** p. 133–136. 11 eqs.) **DWB, DLC**—A method is developed obtaining the vertical temperature distribution of a planetary atmosphere from the law of darken- of the planet's emission spectrum. The intensity of the radiation emerging from a planet is ectly dependent on the vertical thermal structure of its atmosphere. For the monochromatic case e emergent intensity is simply the Laplace transform of the Planck intensity considered as a func- n of optical depth. Now, for a given wavelength the Planck intensity is a single-valued function temperature. Thus, in principle, a complete knowledge of the variation of the emergent intensity th zenith angle (law of darkening) suffices to determine the thermal structure of the accessible tical depth. In practice, to find the Planck intensity we must obtain the inverse Laplace trans- m, which is mathematically tantamount to solving a Fredholm integral equation of the first kind. approximate solution to the problem is obtained using the Volterra method which replaces the egral equation by a set of linear simultaneous equations with the Planck intensity expressed as a ies of step functions. A sample calculation shows that as few as three values of the limb-darkening action yield quantitative information on the vertical temperature distribution. Alterations in the eory necessitated by considerations of band, rather than monochromatic, intensity measurements e indicated. A lightweight, rugged instrument which appears capable of such thermal measure- nts is discussed. This is the far-infrared filter photometer currently being developed by The hns Hopkins University under Air Force Contract AF 19(604)-949. (*Same item as* 9.5–147, *Met. bs.*) *Subject Headings:* **1. Radiative transfer 2. Planetary heat balance 3. Infrared filter pho- meters.**—*Author's abstract.*

12I–63 551.510:523.4:523.07

Kozlovskaia, S. V., **Ekologicheskie tipy planetnykh atmosfer.** [Ecological types of planetary mospheres.] *Priroda*, Moscow, 45(2):82–83, Feb. **1956.** ref. **DLC**—A long discussion of the rious theories as to possibility of life on Venus, Mars and other planets based on knowledge of the tmospheric composition of these planets. It is concluded that the Earth is the only planet in the lar system with enough oxygen to support any kind of life. H. Strughold (1953), G. P. Kuiper 952), O. Schmidt (1950–51) and N. A. Kozyrev (1954) are cited. *Subject Headings:* **1. Planetary mospheres 2. Life on planets.**—*M.R.*

12I–64 551.513

Obuljen, Ante (*Belgrade*), **Die Zirkulation der Erdatmosphäre als ein geophysikalisches Prob- m.** [Circulation of the Earth's atmosphere as a geophysical problem.] *International Union of eodesy and Geophysics. Association of Meteorology, Rome, Sept.* 1954, *Scientific Proceedings.* ondon, Butterworth, **1956.** p. 272–276. **DWB**—The author discusses the reason why planetary tmospheres possess a greater rotation than the planets themselves and the cause of this difference angular velocity and attempts to explain the differences of zonal circulation in the middle and gher latitudes and the origin and formation of the general atmospheric circulation. (*Same item as* 10–140, *Met. Abs.*) *Subject Headings:* **1. General circulation 2. Zonal circulation 3. Planetary mospheric circulation.**—*I.L.D.*

121–65 551.510.5:523.43:523.07

Oparin, A. I. and Fesenkov, V. G., **Zhizn' vo Vselennoĭ.** [Life in the universe.] Moscow. kademiia Nauk SSSR, **1956.** 222 p. 48 figs. **DLC** (QB54.06)—In this book designed for popular ssemination, the origin of life in general (Oparin) and physical conditions in various parts of the niverse (Fesenkov) are described. In the first chapter a theory of the origin of life is developed. hapters 2 and 3 deal with the structure of the universe and of the solar system. In Ch. 4 escape elocities, and consequent chances of retaining an atmosphere are discussed for the Earth and planets nd the evolution of the Earth and its atmosphere is outlined. Chapters 5–8 take up the physical onditions and possibility of life on the Moon, the giant planets, Mars and Venus, and the universe general. Particular attention is given to atmospheric conditions on Mars which are described n the basis of the findings of G. de Vaucouleurs. *Subject Headings:* **1. Life on planets 2. Solar ystem 3. Planetary atmospheres 4. Martian atmosphere.**—*G.T.*

12I–66 523.164.3:523.4

Planets emit radio waves. *Science News Letter*, 69(24):374, June 16, **1956. DWB, DGL**—wo types of radio frequency radiation are emitted from planets (Venus and Jupiter). They are used by 1) heat absorbed from sun's rays and re-radiated and 2) electrical storms similar to thunder orms. The temperature of Venus was found to be >212° although from optical methods a tem- erature only half that high was deduced. The latter applies only to the top of the Venus cloud yer, whereas the radio frequency waves indicate temperatures deep down in the cloud layer or erhaps at the surface of the planet. (*Same item as* 9A–128, *Met. Abs.*) *Subject Headings:* **1. Radio mission from planets 2. Planetary temperatures 3. Venus.**—*M.R.*

12I–67 551.511.33:551.521:551.510:523.2

Sobolev, V. V., **Perenos luchistoĭ energii v atmosferakh zvezd i planet.** [Transfer of radiant energy in stellar and planetary atmospheres.] Moscow. Gosudarstvennoe Izdatel'stvo Tekhniko-Teoreticheskoĭ Literatury, **1956.** 391 p. 24 figs., 37 tables, 103 refs., 1279 eqs. **DWB** (523.8 S677pe)—A standard textbook on radiative transfer applicable to terrestrial, planetary, solar or stellar atmospheres, and based on the classical works of RAYLEIGH, MIE, SHULEIKIN, EDDINGTON, SCHUSTER, MILNE, SCHWARZSCHILD, RAMAN, and others, and the recent theoretical work of CHANDRASEKHAR, AMBARTSUMIAN, VAN DE HULST, MENZEL, MINNAERT, FESENKOV and others. The ten chapters cover: I. General problem and theory; II. Methods of solution; III. Solution of complex diffusion problems by layer methods; IV. Linear integral equations for obtaining the coefficient of brightness; V. Polarization of scattered light in the atmospheres of the earth and of planets, stars and in deep stratified media; VI. Probability of quanta emerging from a medium; VII. Emitting median bounded by reflecting surfaces; VIII. Diffusion of illumination with partial transfer; IX. Non-stationary fields of illumination; X. Approximate solutions of basic problems such as planetary atmospheres or the sea. (*Same item as* 12.8–8, Aug. 1961, *Met. Abs.*) *Subject Headings:* **1. Radiative transfer textbooks 2. Radiation in planetary atmospheres 3. Stellar atmospheres 4. Optics of the sea.**—*M.R.*

12I–68 523.2:574.6:523.01

Strughold, Hubertus (*U. S. A. F. School of Aviation Medicine*), **Ecosphere in the solar planetary system (helio-ecosphere).** *International Astronautical Congress, 7th Congress, Rome* 1956, *Proceedings*, issued Rome, **1956.** p. 277–288. 3 figs., 12 refs. English, German and French summaries p. 277–278. **DLC** (TL787.I44)—The ecosphere in the solar planetary system is a biologically defined concept concerning the possibility of life on planets. It refers to a zone surrounding the Sun, in which solar radiation on the one hand does not exceed the ecological maximum, and on the other hand does not fall below the ecological minimum. Within these limits we recognize in the planetary system a biotemperature belt, a "liquid water belt" (H. SHAPLEY), and an oxygen belt. These belts all lie in about the same area around the Sun. To cover all of these ecological factors by a general concept, the term ecosphere of the Sun has been suggested. The decisive factor is the distance from the Sun. In our planetary system the ecosphere evidently extends from the orbit of Venus to beyond Mars, roughly, a distance of about 50 to 150 million miles or 80 to 240 million km from the Sun. The zone itself is therefore, a relatively narrow zone within our planetary area. The concept of ecosphere may also be applied to other Suns in the Universe (Stellar-ecosphere). *Subject Headings:* **1. Life on planets 2. Ecospheres 3. Solar system.**—*Author's abstract.*

12I–69 551.510.41:523.8

Strughold, Hubertus (*Randolph Air Force Base, Texas*), **The oxygen belt in the planetary system.** *Journal of Astronautics*, N. Y., 3(2):27–28, 52, Summer **1956.** 3 figs., table. **DLC**—The earth's atmosphere has evolved from an original hydrogen atmosphere (a sphere of reducing or reduced chemicals) to the present oxygen atmosphere. A parallel to this development is found if present planetary atmospheres are considered in respect of their distance from the sun, the more distant planets having reduced atmospheres and the closer ones oxidized atmospheres. The zone in which oxidized atmospheres are found (Mars, Earth and Venus) can be called the oxygen belt of the planetary system. Other biologically significant belts are the liquid water and the biotemperature belt. Their combination constitutes the life zone or ecosphere. (*Same item as* 10.10–190, *Met. Abs.*) *Subject Headings:* **1. Origin of atmosphere 2. Atmospheric composition 3. Planetary atmospheres**—*G.T.*

1957

12I–70 551.510.4

Bates, D. R. (*Queen's Univ. of Belfast*), **Composition and structure of the atmosphere.** (In Bates, D. R., (*ed.*), **The earth and its atmosphere.** N. Y., Basic Books, **1957.** p. 97–112. 2 figs. 2 tables.) **DLC**—The earth's atmosphere, its composition and structure, the inert gases, CO_2 and minor constituents; pressure, density, and temperature aloft as determined from rockets; compositional and diffusive separation; heat balance, the nitrogen cycle, etc., are discussed and illustrated by a few schematic diagrams. (*Same item as* 9.11–147, Nov. 1958, *Met. Abs.*) *Subject Headings:* **1. Atmospheric structure 2. Atmospheric composition.**—*M.R.*

12I–71 523.

Bronshten, Vitaliĭ Aleksandrovich, **Planety i ikh nabliudenie.** [Planets and their observation.] Ed. by N. N. Sytinskaia. Moscow, Gosudarstvennoe Izdatel'stvo Tekhniko-Teoreticheskoĭ Literatury, **1957.** 207 p. 66 figs., tables, bibliog. p. 203–207, eqs. **DLC** (QB601.B85)—The book is intended for amateurs interested in observation of planets. After a general review of the solar

tem the modern research methods are outlined. Advice for observations of planets by means of dest instruments available to the amateur is given. The processing of observational data for uable scientific results is explained. Bibliography, tables, and coordinate networks for mapping planets are appended, as well as a "planet finder." *Subject Headings:* **1. Astronomical observers adbook 2. Astronomical data processing.**—*S.N.*

12I–72 551.510.5:551.513.1:546.11

De Marcus, Wendell C. (*Yale Univ. Observatory and Union Carbide Nuclear Co., Oak Ridge, n.*), **Model hydrogen atmospheres.** *Société Royale des Sciences de Liège, Mémoires*, Ser. 4, 182–185, **1957.** 3 figs., 5 refs., eqs. **DLC, DWB** (P S678v)—The present paper attempts a antitative representation of the density gradient of isothermal atmospheres of pure hydrogen for nperatures between 100°K and 200°K. Since published PVT data in this temperature range are own for densities up to 500 Amagat and since solidification should occur at densities around 2000 agat, extrapolation must be used to fill the gap in the PVT data. This extrapolation is carried and the results are indicated briefly. *Subject Heading:* **1. Model hydrogen atmospheres.**—*thor's introduction & A.J.M.*

12I–73 523.51.551.521.3:523.4

†Dollfus, A., **Etude des planètes par la polarisation de leur lumière.** [Study of planets by the larization of their light.] *Annales d'Astrophysique*, Paris, Supplement No. 4, **1957.** 116 pages, figs., tables, eqs. Bibl. pp. 113–114. Russian summary. **DWB**—The instruments used make possible to measure the proportion of polarized light and the direction of the preferred vibration small areas of the surface of planets' discs and in limited spectral fields. The measurements made m 1948 to 1954 on Mercury, Venus, Mars, Jupiter and the earth shine have been compared with terminations taken on terrestrial samples. The nature of their soils, their clouds and the densities their atmospheres could thus be stated precisely. The work is composed of 5 chapters which deal cessively with: definitions, instruments and observation conditions, polarization of the planets' ht, interpretation of the polarimetric observations and conclusions. *Subject Headings:* **1. Polarizan of planets 2. Polarization of earth shine 3. Planetary atmospheres.**—*A.V.*

12I–74 621.396.8:523.164.8

Horner, F., **Radio noise from planets.** *Nature*, London, 180(4597):1253, Dec. 7, **1957.** 3 refs. **WB**—J. D. KRAUS suggested that high frequency radio noise received from Jupiter and Venus ay originate in discharges similar to terrestrial lightning (*Nature*, 178:33, **1956**). The author of the esent note compares amplitudes of sferics and of planetary radio noise and finds the latter to be nsiderably larger than might be expected on the basis of KRAUS's hypothesis. The discrepancy uld be explained by larger storm areas on the two planets and superposition of several discharges. ut before the hypothesis could be accepted an explanation would have to be found for the fact that dio noise from Venus and Jupiter is received in the form of bursts rather than of continuous noise. (*Same item as* 9A–154, *Met. Abs.*) *Subject Headings:* **1. Planetary radio noise 2. Radio emission om planets.**—*G.T.*

12I–75 551.510:551.513:523.4 551.511.33:532.2

Royal Meteorological Society and Royal Astronomical Society, **Planetary atmospheres and nvection in rotating fluids: a symposium held at Burlington House on May 23–24, 1957.** 14 p. timeo. (Abstract of papers presented at the Symposium.)—Also: Davies, T. V., **Planetary atospheres and convection in rotating fluids.** *Nature*, London, 180(4600):1455–1461, Dec. 28, **1957.** **WB, DLC**—DAVIES article is a detailed summary of the papers delivered at a symposium on **lanetary Atmospheres and Convection in Rotating Fluids** of the Royal Meteorological Society and e Royal Astronomical Society, London, May 23–24, 1957. Introductory address was by Sir arold Jeffreys. Other papers presented were: Kopal, Zdenek: **The basic observational data on lanetary atmospheres.** Sheppard, P. A.: **The general circulation of the outer planets.** Tucker, . B.: **Transfer processes in planetary atmospheres.** Hide, Raymond: **Experiments on convection rotating fluids.** Goody, R. M.: **The thermal structure of Mars.** Urey, H. C.: **The escape of lanetary atmospheres.** Sutcliffe, R. C.: **The influence of condensation on planetary atmospheres.** awyer, J. S.: **Jet streams in the earth's atmosphere.** Davies, T. V.: **The theory of the experiments n convection in rotating fluids.** Charney, J. C.: **Theory of the general circulation of the atmosphere.** ady, E. T.: **The physical parameters characterizing the dynamics of planetary atmospheres.** SIR HAROLD JEFFREYS outlined the historical development of the problem of the circulation patterns hich can develop in a fluid on a rotating sphere beginning with the work of MARGULES and the evelopment of the problem of the onset of convection in rotating fluids beginning with the work of ÉNARD (1900). KOPAL'S paper discussed spectrometer and photometer techniques. The gaseous onstituents of the atmospheres and some possible temperature ranges were considered. UREY

discussed the role of escape and of photodissociation in the evolution of planetary atmospheres. SHEPPARD summed up the main problems dominating the discussions—showing the evidence for the presence of jet streams in other planets and in experimentally simulated atmospheres, the origin and maintenance of the jet stream, etc. (*Same item as* 10.3–180, *Met. Abs.*) *Subject Headings:* **1. Planetary atmospheres 2. Planetary circulation 3. Convection in rotating fluids 4. Jet streams**—*I.L.D.*

12I–76 523.22 523.51 550.4

†Urey, Harold Clayton, **Boundary conditions for theories of the origin of the solar system.** *Physics and Chemistry of the Earth*, Vol. 2, pub. N. Y. Pergamon Press, **1957.** p. 46–76. 9 tables, bibliog. p. 73–76, eqs. **DWB** (551 P578), **DLC** (QC501.P53)—The escape of rare gases from the planets, the variation in densities of the terrestrial planets, the temperature of formation of the terrestrial planets, formation structure and shape of the moon, Mars and the Earth; chemical composition of earth as evidenced by meteorites, origin of meteorites, evidenced from major planets and their satellites, and a schedule of events during formation of the solar system in outline form are reviewed in this excellent summary paper. A bibliography of 100 references on origin and chemistry of earth and planets is appended. It is concluded that most of the planets formed at comparatively low temperatures (i.e., as solids). *Subject Headings:* **1. Origin of earth 2. Planetary origin 3. Meteorites 4. Geochemistry.**—*M.R.*

1958

12I–77 551.510.536:523.4 551.510.41:546.29

Biutner, E. K., **Dissipatsiia gaza iz atmosfer planet, I., K voprosu o dissipatsii izotermicheskogo ideal'nogo gaza v tsentral'nom pole tiagoteniia.** [The dissipation of gas from planetary atmospheres. Pt. I, The dissipation of an isothermal ideal gas in a central field of gravitation.] *Astronomicheskii Zhurnal*, Moscow, 35(4):572–582, July/Aug. **1958.** 4 figs., table, 7 refs., 29 eqs. Transl. into English in *Soviet Astronomy AJ*, New York, 2(4):528–537, July/Aug. **1958. DLC**—The present study is a development of the Lennard-Jones method for calculating the rate of dissipation of planetary atmospheres. The rate of dissipation of particles from each layer of an ideal gas in a central field is derived; it is found to be less than the rate of dissipation of a gas in equilibrium (For Pt. I of this paper *see* 12I–93). *Subject Headings:* **1. Gas dissipation from planets 2. Dissipation of planetary atmospheres.**—*From author's abstract.*

12I–78 551.507.362:536.24:551.510.5:523.7

Gazley, Carl, Jr. (*Rand Corp., Santa Monica, Calif.*), **Deceleration and heating of a body entering a planetary atmosphere from space.** *U. S. Air Force. Office of Scientific Research, Vistas in astronautics: First Annual Astronautics Symposium, Feb.* 1957. Pub. N. Y. Pergamon Press, **1958.** p. 8–32. 19 figs., 5 tables, 10 refs., 34 eqs. **DWB** (629.1388 U581as)—The dynamics and thermodynamics of several types of entry into the atmospheres of Venus, Earth, and Mars are considered. Deceleration and heating are most severe for direct entry from a parabolic approach orbit. Appreciable reduction is obtained if the vehicle can be maneuvered into a circular satellite orbit; entry by decay from a circular orbit is more gradual and both deceleration and heating occur higher in the atmosphere. Further reduction is obtained through the use of a body with gasdynamic lift. In all cases surface heating rates can be reduced by increasing the drag-mass ratio of the body or the lift-mass ratio in the case of a lifting body. Based on current estimates of planetary atmospheres and hypersonic gas dynamics, successful penetration of the atmospheres of Venus, Earth, and Mars appears feasible for manned re-entry and a non-ablating surface providing a proper planetary approach can be made. Heating and deceleration during entry into the atmospheres of Venus and earth are almost identical. Heating and deceleration are appreciably lower for entry into the Martian atmosphere. *Subject Headings:* **1. Interplanetary flights 2. Re-entry problems.**—*Author's abstract.*

12I–79 521.154:523.4:523.0

Hess, Seymour L. (*Dept. of Meteorology, Florida State Univ.*), **Atmospheres of other planets.** *Science*, Wash., D. C., 128(3328):809–814, Oct. 10, **1958.** 3 figs., table, 19 refs. Also: **Atmosphärische Bedingungen auf anderen Planeten.** [Atmospheric conditions on other planets.] *Weltraumfahrt*, Frankfurt a.M., 10(3):87–89, Sept. **1959.** 3 figs. **DLC**—The atmospheres of the planets Venus, Mars and Jupiter are treated briefly. The possibilities for observation of the three planets and temperature and composition of their atmospheres are discussed. The author discusses the possibility of life on these planets; a lower form of life may exist on Venus and Mars, but it would not be similar to any form of life on earth. (*Same item as* 11.4–99, *Met. Abs.*) *Subject Headings:* **1. Planetary atmospheres 2. Life on planets.**—*E.K.*

12I–80 551.510.535:551.524.7

Kallmann, H. Korf (*Univ. of California at L. A.*), **A new model of the atmosphere and iono-here.** *Annales de Géophysique*, Paris, 14(2):140–143, April/June **1958.** 4 figs., 11 refs. **DLC**—model giving the temperature distribution and electronic density with altitude up to 300 km is sented. The theoretical study of the ionosphere is still very complex since such a great number of certainties in the various physical quantities are involved, such as photon emission from the solar iosphere, air composition of the earth's atmosphere, true absorption and recombination coeffi-nts. (*Same item as* 10.4–159, April 1959, *Met. Abs.*) *Subject Headings:* **1. Atmospheric models ionosphere models 3. Solar atmosphere 4. Atmospheric composition.**—*A.V.*

12I–81 523.3/4

Kharadze, E. K.; Dzhapiashvili, V. P. and Megrelishvili, T. G., **Lunnye i planetnye issledovaniia bastumani.** [Lunar and planetary research in Abastumani.] *Akademiia Nauk SSSR, Vestnik*, (11):42–45, **1958. DLC**—Astrophysical observations, i.e., photometric, colorimetric and polari-ric readings of the planets and the moon, are used for widening our knowledge of the structure the Earth's upper atmosphere. Lunar formations with various morphological and physical perties reflect light with a different polarization degree, a maximum from the seas and a minimum n continents. An inverse relation of the polarization degree to albedo has been established. otometry of the Moon during eclipses has given valuable results. The eclipsed part of the Moon, ticularly at the edge of the terrestrial shadow, faintly illuminated by solar radiation reflected from Earth's upper atmosphere, has given information about content and distribution of ozone in the er atmospheric layers. The opposition of Mars in 1956 was especially convenient for visual, otographic and electropolarimetric measurements and observations of variations of the southern cap shape. A new, recently assembled electropolarimeter of V. I. MIUKHKIUP's design was ached to a 40 cm refractor for a systematic survey of the lunar surface, of Mars in opposition in 58 and of the Galilean satellites of Jupiter. Electrophotometric observations of the night-sky-t, mostly in infrared, have been underway since 1952, yielding data on the structure of the upper osphere and the vertical pressure and density distribution. The obtained crepuscular data are good agreement with measurements by rockets up to an altitude of 70–80 km and even up to 120 with improved methods by FESENKOV. A detailed analysis of spectral characteristics of the light sky revealed the correlation between solar activity and the upper atmospheric layers, as well characteristics of the ionosphere (critical frequencies). Luminescence in the spectral range about 00 A was observed in two thin atmospheric layers at heights of 30–40 km and 90–100 km. *Subject adings:* **1. Lunar research 2. Planetary research 3. Martian observations 4. Atmospheric ucture 5. Night airglow data 6. Abastumani, U.S.S.R.**—*S. Nowinska.*

12I–82 523.72:523.8:621.396.8

Kraus, John D. (*Radio Observatory, Ohio State Univ.*), **Planetary and solar radio emission at 11 ters wavelength.** *Institute of Radio Engineers, N. Y., Proceedings*, 46(1):266–274, Jan. **1958.** figs., 16 refs. **DLC**—Observations are described of radio emissions from the Sun, Jupiter, and nus during 1956 and early 1957 at a wavelength of 11 m. Records are presented of solar 11-meter iliation at the time of a large (importance 3) flare on Aug. 31, 1956, and during other periods of ar activity. The effect of scintillation on records of radio stars also is illustrated. A number of ords of impulsive radiation from Jupiter at both slow and fast recorder speeds is shown. Many the short pulses consist of distinct pairs or triplets. An echo mechanism to explain the multiple lses is postulated and observed trends in pulse separation compared to those expected with such a chanism. The stronger Jupiter pulses indicate a peak radiated radio power at the source of the ler of 10 kilowatts per cps bandwidth. Observations of 11-m radio emission from Venus are scribed and one record is presented for which the probability is only about one in a hundred usand that it is due to a random process instead of Venusian radiation. (*Same item as* 11.5–158, *et. Abs.*) *Subject Headings:* **1. Radio emission from planets 2. Solar radio radiation.**—*Author's stract.*

12I–83 551.510.535:523.164.3

Link, František (*Czechoslovak Acad. of Sc., Astronom. Inst.*), **Sur les ionosphères planetaires.** Planetary ionospheres.] (In: Paris Symposium on Radio Astronomy, July–Aug. 1958, [**Proceed-gs**], pub. Stanford Univ. Press, **1959.** p. 58–60. fig., 6 refs., eqs.) **DLC** (QB475.P26)—Recent search permitted pin-pointing planetary radio emissions to sources localized on the planetary disk. nese observations facilitated the studies of planetary ionospheres based on our advanced knowledge terrestrial conditions. An analysis of an emission source ionized below the maximum was carried t. It was found that the reception curve (histogram) is the broader, the higher the received equency. The histogram is not symmetrical with respect to the central meridian, due to ionization the sun. The mean histogram of reception during a long time period may be broadened because

of the phase angle shift within this period. Computations using C. A. SHAIN's data (Aust. J. Sci. 9, 61 (1956)) on Jupiter for $\Delta\lambda = 67°$ ($\Delta\lambda$ is the longitude of the source with respect to the center of the disk) gave a corresponding $F = 8$ Mc/sec and a maximum concentration $N_0 = 8.10^5$ electrons/cm³. The same values deduced from C. H. BARRON *et al.* (Nature, 180, 381(1957)) data were: $F = 1$ Mc/sec and $N_0 = 2.10^6$ electrons/cm³. These results seem high in comparison with terrestrial conditions. According to F. F. GARDNER (Symposium on Radio Astronomy, Melbourne, 1957) the width $\Delta\lambda$ decreases with frequency which contradicts the above theory. *Subject Headings:* **1. Radio emission from planets 2. Planetary ionospheres.**—*S. Nowinska.*

12I–84 523.164.3

Mayer, C. H.; McCullough, T. P. and Sloanaker, R. M. (*all, Radio Astronomy Branch, U. S. Naval Res. Lab., Wash., D. C.*), **Measurements of planetary radiation at centimeter wavelengths.** *Institute of Radio Engineers, N. Y., Proceedings*, 46(1):260–266, Jan. **1958.** 5 figs., table, 11 refs. 3 eqs. Also: Mayer, Cornell H., **Planetary radiation at centimeter wave lengths.** *Astronomical Journal*, New Haven, Conn., 64(2):43–45, March **1959.** 13 refs. **DLC**—Radiation from the planets Venus, Mars, and Jupiter, has been measured at wave length of 3.15-cm using the Naval Research Laboratory 50-ft reflector and a narrow-band radiometer. The apparent blackbody temperature for Mars and Jupiter derived from the radio measurements agree reasonably well with the results of infrared radiometric measurements. For the case of Venus, the apparent blackbody temperature derived from the 3.15-cm measurements is about a factor or two higher than the value derived from the infrared measurements. A measurement of the radiation from Venus at 9.4-cm wavelength was made using the same antenna. The apparent blackbody temperature derived from this measurement agreed well with the value derived from the 3.15-cm measurement, but the accuracy of the 9.4-cm result was low because of the small flux density or radiation and the small number of observations. (*Same item as* 11.6–143, *Met. Abs.*) *Subject Headings:* **1. Radio astronomy 2. Radio emission from planets.**—*Authors' abstract.*

12I–85 523.164.353:523.164.35

Mayer, C. H.; McCullough, T. P. and Sloanaker, R. M. (*all, Radio Astronomy Branch, U. S. Naval Research Lab., Wash., D. C.*), **Observations of Mars and Jupiter at a wave length of 3.15 cm.** *Astrophysical Journal*, Chicago, 127(1):11–16, Jan. **1958.** 4 figs., 13 refs. **DLC** (QB1.A9)—A number of observations of Mars were made with the Naval Research Laboratory 50 foot reflector at a 3.15 cm wave length during Sept. 1956, when the planet was near opposition. Of these, 7 observations were selected for a quantitative reduction, which yielded a black-body temperature for Mars of 218°±76°K (m.e.). Twenty-nine observations of Jupiter were made with the same apparatus in May, 1956. A black-body temperature of 140°±56°K (m.e.) was found from these data. Further observations of improved accuracy were made in March, 1957, when Jupiter was near opposition. A quantitative reduction of the average of 45 of these observations gave a black-body temperature for Jupiter at the 3.15 cm wave length of 145°±26°K (m.e.). *Subject Headings* **1. Radio emission from Mars 2. Radio emission from Jupiter.**—*Authors' abstract.*

12I–86 551.510.536:523.59 551.593

Ovenden, Michael W. (*Glasgow Univ. Obs.*), **Some studies in polarization.** *Science Progress*, London, 46(182):276–285, April **1958. DLC**—Artificial satellites will enable astrophysicists to get better observations of planets and stars, etc., especially spectral and polarization observations which are greatly affected by the earth's atmosphere. Recent discoveries along these lines have been made at the Pic-du-Midi Observatory at 2862 m elevation in the Pyrenees, by A. DOLLFUS, including discoveries of the similarity of the surface of Mercury and the Moon. Observation of Venus, Mars, Jupiter and the zodiacal light by polarization techniques are also discussed on the basis of work of other astrophysicists at other observatories. A. DOLLFUS recently published many of his discoveries and data (*see* item 12I–73). *Subject Headings:* **1. Polarization 2. Satellite uses in astronomy.**—*M.R.*

12I–87 551.510:523.4:523.

Quiring, H. (*Berlin*), **Atmosphären und Lebensmöglichkeiten auf den Planeten.** [Atmosphere and possibility of life on the planets.] *Meteorologische Rundschau*, Berlin, 11(3):74–80, May/June **1958.** 4 tables, refs. **DWB DLC**—The author discusses the atmospheric conditions under which life can exist on the earth, the atmospheric conditions under which life first originated on the earth (CO_2-H_2 atmosphere), the origin of O_2 under the action of bacteria and aquatic plants, the escape of gases from cosmic bodies as determined by the relation of molecular velocity and dissociation rate, and the development of the Earth and planets. For each of the planets Jupiter, Saturn, Uranus, Neptune, Mercury, Venus and Mars a summary is given of available knowledge of the development of the individual atmospheres, existing evidence of the presence or absence of an atmosphere, and po

...le constituents of the atmosphere. It is concluded that no planet or moon is at present in a state ...ilar to that of the earth. No body of the solar system could support a terrestrial animal. Tables ... presented giving an outline of early stages of the development of the earth, including the compo... on and state of the atmosphere corresponding to various geologic states; dissociation velocity of ...lecules on the sun, planets and moons; thermal molecular velocities of atmospheric gases, and ...gases at the surface of cosmic bodies, and visual albedo and atmospheres of planets and moons. ...*bject Headings:* **1. Planetary atmospheres 2. Life on planets.**—*I.L.D.*

12I–88 523.2(02)

...†*Sharonov, Vsevolod Vasil'evich, **Priroda planet.** [The nature of the planets.] Moscow, ...sudarstvennoe Izdatel'stvo Fiziko-Matematicheskoĭ Literatury, **1958.** 552 p. 110 figs., 47 ...bles, refs., eqs. **DLC** (QB601.S53)—In this thorough and extensively documented text by one ... the most quoted authorities on planetary science, knowledge (as of 1956) concerning properties ... the planets and their satellites is presented in a clearly organized manner. In collecting this ...terial the author has sought to emphasize observational facts and to deal with theoretical problems ...ly insofar as they are necessary in order to understand those facts. The contents of the book are ... follows: Ch. 1, Introduction; history; general description of the solar system; orbits; conditions ... visibility; etc. Ch. 2, observations by means of telescopes; including a discussion of the effect of ...e Earth's atmosphere upon such observations. Ch. 3, geometry and mechanical characteristics ... objects in the solar system, such as phases, orbital elements, masses, etc. Ch. 4, topography and ...rtography. Ch. 5, topographic description of each individual object. Ch. 6, photometry, colori... ...etry and spectrophotometry; reflectivity, albedo, spherical albedo. Ch. 7, photometry of the ...sks of planets, including discussion of different techniques, methods of standardization and a ...tailed treatment of the photometry of the Moon's surface. Ch. 8, optics of planetary atmospheres, ...ructure of the atmospheres of planets, refraction phenomena; extinction; absorption spectra; ...attering by gases and aerosol; brightness of the scattering medium; influence of a scattering ...mosphere on the color of a planet; and twilight phenomena. Ch. 9, physical conditions in the ...lar system and on the individual planets. Throughout these chapters a considerable amount of ...bservational results is presented. Each chapter is followed by an extensive bibliography, including ... total of around 700 references to Russian and foreign literature (with emphasis on the former). ... glossary of terms and abbreviations is appended. *Subject Headings:* **1. Planetary science ... Planetary textbooks 4. Planetary atmospheres 5. Atmospheric optics 6. Solar system.**—*G.T.*

12I–89 535.33 551.521.18

Sutherland, G. B. B. M. (*National Physical Lab., England*), **Infra-red radiation.** *Institution of ...lectrical Engineers, London, Proceedings, Pt. B.*, 105(22):306–316, July **1958.** 17 figs., 3 tables, ...3 refs. "48th Kelvin Lecture." **DLC**—Philosophical as well as experimental approach has been ...llustrated in this article on the absorption of near infra-red radiation by various liquids. Various ...ethods for the detection of radiation are described here. Using as an example a carbon dioxide ...olecule in which the atoms have been arranged symmetrically the author illustrates the basic ...rinciples of infra-red analysis. The application of infra-red spectroscopy, water-vapor line at 1.25 ...m and terrestrial and planetary atmospheric absorption are summarized. The rest of the paper ...ncludes the chemistry of petroleum, proteins, and acids. A table is given showing various compon... ...nts found in the atmospheres of Earth, Mars, Venus, Jupiter, Saturn, Uranus and Neptune as ...etermined by infrared absorption. *Subject Headings:* **1. Infrared radiation 2. Planetary infrared ...bsorption 3. Atmospheric composition.**—*N.N.*

12I–90 523.2(02)

Whipple, Fred Lawrence, **Earth, Moon and planets.** New York, Grosset and Dunlap, **1958.** ...93 p. 140 figs. (incl. photos), 4 tables. (*Harvard Books on Astronomy*, ed. by Harlow Shapley and ...Bart J. Bok.) **DLC** (QB601.W6)—The 1958 edition of this book is essentially the same as the 1941 ...dition with the exception that some textual material and several tables on satellites have been ...dded to the later edition. Such topics as the origin and evolution of planets, the discovery of ...Neptune and Pluto, planetary motions, satellites of planets and other characteristics are covered. ...On the subject of planetary atmospheres the author presents the following information: Mercury ...nd the moon have no atmosphere; the lack of atmosphere has been explained by their low gravity ...nd consequent low escape velocity; the Earth and Venus have atmospheres composed of nitrogen, ...oxygen and carbon with hydrogen combined in water or formaldehyde; in Jupiter's atmosphere ...spectrographic observation found two chemical constituents: ammonia and methane; the dearth ...of water vapor on Mars, as indicated by the spectrograph, does not exclude the deduction that the ...polar caps are snow, but it does seriously limit estimates of the quantity present; Mars' atmosphere ...s certainly rare, in spite of the possible sixty-mile depth. The discovery of CO_2 in the atmosphere ...of Mars adds greatly to our knowledge of its atmosphere. The planets Uranus and Neptune are

certainly enveloped with atmospheres resembling those of Jupiter and Saturn, characterized by lac of gaseous ammonia and an abundance of methane. Saturn's atmosphere contains more methan and less ammonia than Jupiter's. Pluto, like other poor reflectors, possesses little or no atmosphere *Subject Headings:* **1. Planetary science 2. Planetary textbooks 3. Planetary atmospheres 4. Moo 5. Solar system.**—*E.K.*

12I–91 523.164.3

†Zhelezniakov, V. V., **Radioizluchenie Solntsa i planet.** [Radio radiation of the Sun and planets. *Uspekhi Fizicheskikh Nauk*, Moscow, 64(1):113–154, Jan. **1958.** 15 figs., 158 refs., eqs. **DWB DLC**—The author presents a critical review of experimental and theoretical investigations of th radio radiation of the Sun and planets that have been published chiefly during the period 1953–1957 The contents of this review include the following: radio radiation of the "quiet Sun," increased radi radiation associated with sunspots, bursts of solar radiation, theory of heat radiation of the Sun theory of sporadic radio radiation of the Sun, observation on the radio radiation of Jupiter, Venu and Mars, and hypothesis on the origin of sporadic radio radiation of Jupiter and Venus. *Subje Headings:* **1. Solar radio emissions 2. Radio emission from planets.**—*I.L.D.*

1959

12I–92 551.510.5(044) 523.2(044

Biermann, Kurt-R. and Körber, Hans-Günther, **Ein bisher unveröffentlichter wissenschaftliche Brief von Carl Friedrich Gauss an Alexander von Humboldt.** [A hitherto unpublished scientifi letter by Carl Friedrich Gauss to Alexander von Humboldt.] *Forschungen und Fortschritte*, Berlin 33(5):136–140, May **1959.** 26 tables. **DLC**—The letter of Gauss that is reproduced contains critical discussion of WALLERTON'S paper on the finite character of the Earth's atmosphere and o planetary atmospheres; on the direction of movement of the solar system; cosmic space and oblatenes of the Sun. *Subject Headings:* **1. Earth's atmosphere 2. Planetary atmospheres 3 Gauss, Car Friedrich.**—*I.L.D.* Ⓢ

12I–93 551.510.536:523.4 551.510.41:546.29

Biutner, E. K. (*A. I. Gertsen Leningrad Pedagogical Inst.*), **Dissipatsiia gaza iz atmosfer planet II. Polnaia skorost' dissipatsii gaza iz atmosfery planety. Problema zemnogo geliia.** [Gas dissipa tion from planetary atmospheres, Pt. 2, The total velocity of gas dissipation from a planetary at mosphere. The problem of terrestrial helium.] *Astronomicheskiĭ Zhurnal*, Moscow, 36(1):89–99 Jan./Feb. **1959.** 4 figs., 23 refs., 33 eqs. Transl. into English in *Soviet Astronomy AJ*, New York 3(1):92–102, Jan./Feb. **1959. DLC**—A general expression has been found for the velocity of ga dissipation from a planetary atmosphere, from which follow as limiting cases the formulas deduce LENNARD-JONES for a dense and rarefied atmosphere. The velocity of gas dissipation and also th thickness and position of the layer from which the dissipating process is most effective were calculate for two cases: 1) a single-component atmosphere, 2) an atmosphere composed of a heavy gas with small admixture of a light gas. It was found that in the latter case (all other conditions being identical) the thickness of the layer is much less than in the former. In all cases the thickness of th layer increases with increasing kinetic energy of the gas. The distribution of the intensity of dissipa tion along the effective layer has been calculated and the position of the layer of maximum intensity determined. With the help of a two-component atmosphere, the possibility of dissipation of helium from the Earth's atmosphere under present conditions was investigated. The estimates of th necessary kinetic energy, at a height of about 500 km, are given. (For Pt. 1 of this paper *see* 12I–77.) *Subject Headings:* **1. Gas dissipation from planets 2. Helium in upper atmosphere 3. Dissipation of planetary atmospheres.**—*Author's abstract.* Ⓢ

12I–94 551.510:523.4 551.510.41:546.29

Biutner, E. K., **O dissipatsii vodoroda iz atmosfer planet.** [Hydrogen dissipation from planet ary atmospheres.] *Akademiia Nauk SSSR, Doklady*, 124(1):53–56, Jan./Feb. **1959.** 23 refs. 5 eqs. **DLC**—The dissociation of water vapor in the upper layer of the atmosphere is reviewe with special attention to the magnitude of hydrogen dissipation from the planet. The computation of the rate of dissociation of water vapor under intensive solar radiation is discussed with a set o formulas in reference to the data given by other authors. The author's formulas and other considera tions by him are also applied to the Martian atmosphere, which probably also has water vapor and oxygen. The quantity of oxygen in the Martian atmosphere required for protection of water from intensive photo-dissociation is near the limit which can be spectroscopically detected. This oxyge quantity, evaluated in A. I. LEBEDINSKII'S work is dependent upon altitude in the Martian at mosphere and its interim velocity which are discussed with numerical values of oxidation and dissipa tion of water from the surface of Mars. *Subject Headings:* **1. Hydrogen dissipation from planet 2. Hydrogen in upper atmosphere 3. Dissipation of planetary atmosphere.**—*N.P.S.* Ⓢ

12I–95 551.521.14:523.4 523.035:313

Boggess, Albert, III and Dunkelman, Lawrence (*both, U. S. Naval Res. Lab.*), **Ultraviolet flectivities of Mars and Jupiter.** *Astrophysical Journal*, Chic., 129(1):236–237, Jan. **1959.** table, efs. **DWB, DLC**—Ultraviolet observations of Mars and Jupiter were made on the night of March 1957 from New Mexico in order to measure the stellar fluxes at wave lengths near 2700 Å. The ort gives a brief analysis of the results. The flux at 2700 Å for Mars at a phase angle of 32.4° s 2.0×10^{-8} ergs/cm² sec. Its reflectivity was 0.24. Jupiter showed a reflectivity of 0.26 at a ase angle of 2.3° and a flux density of 1.5×10^{-7} ergs/cm² sec. The total predicted reflectivity s only 0.15. It was found that in order to make the predicted reflectivity consistent with observa-n, the haze particles must have a considerably higher reflectivity in ultraviolet than in blue light. *ame item as* 11.4–98, *Met. Abs.*) *Subject Heading:* **1. Albedo of planets.**—*N.N.* Ⓢ

12I–96 551.510.62:523.4:621.396.029.6

Chandra, Suresh and Srivastava, B. P. (*both, Dept. of Physics, Univ. of Allahabad, India*), **sorption of microwaves in planetary atmospheres.** *Zeitschrift für Astrophysik*, Berlin, 47(2):127–1, **1959.** 5 tables, 11 refs., 13 eqs. **DLC** (QB1.Z4)—The absorption of microwaves in various netary absorbing gases has been calculated. The integrated absorption due to oxygen present in Earth's atmosphere was found to be 0.16 db, 0.099 db, and 0.092 db at $v=1$ cm^{-1}, $v=0.33$ cm^{-1} $v=0.1$ cm^{-1}, respectively. The absorption due to nitrous oxide in Mars and Venus and the sorption due to ammonia in Mars, Venus and Jupiter have also been calculated. The absorption to Earth's ionosphere has been found to be negligible at these frequencies. Total absorption $v=1$ cm^{-1}, $v=0.33$ cm^{-1} and $v=0.1$ cm^{-1}: Earth 0.16 db, 0.099 db, 0.092 db; Mars 0.087 db, 19 db, 0.002 db; Venus 0.17 db, 0.037 db, 0.003 db; Jupiter 29.498 db, 6.374 db, 0.505 db. It ms, therefore, that the atmospheres of most of the planets except Jupiter offer negligible attenua-n to microwaves. *Subject Headings:* **1. Microwave absorption 2. Planetary atmospheres.**—*thors' abstract.* Ⓢ

12I–97 551.510:523.4:629.19

Chapman, Dean R. (*Ames Res. Center, Moffett Field, Calif.*), **An analysis of the corridor and dance requirements for supercircular entry into planetary atmospheres.** *U. S. National Aeronautics and Space Administration Technical Report*, R-55m, **1959.** 47 p. 21 figs., 8 refs., numerous . **DWB** (629.1308 U585trR)—The analysis of supercircular entry is developed around a new mensionless parameter which combines certain conditions at the conic perigee altitude with certain aracteristics of the vehicle; this parameter conveniently determines either deceleration-limited or ting-limited corridor widths for elliptic, parabolic, or hyperbolic approach trajectories. Illustra-e calculation of corridor widths and the associated guidance problems are presented for Venus, rth, Mars, Jupiter, and Titan. Generalized curves are presented for application to various entry ditions. *Subject Headings:* **1. Re-entry into atmosphere 2. Planetary atmospheres 3. As-nautics.**—*Author's abstract.* Ⓢ

12I–98 523.4

†De Marcus, Wendell C., **Planetary interiors.** *Handbuch der Physik*, Berlin, 52:419–448, **1959.** gs., 14 tables, numerous refs., 12 eqs. **DLC**—Theoretical models are presented and discussed the mass and radius of cold planetary bodies, their figure, features, structure and the composition terrestrial and Jovian planets, of Jupiter and Saturn, of Uranus and Neptune. Data through 8 are presented in tables and graphs. (*Same item as* 11.5–103, *Met. Abs.*) *Subject Headings:* **Planetary interiors 2. Jovian planets 3. Planets 4. Cold planetary bodies 5. Planetary uctures 6. Planetary composition.**—*M.R.*

12I–99 551.521.3:523.42:523.43

†Firsoff, V. A., **On the radiation balance in the atmospheres of the Earth, Venus and Mars.** *tish Astronomical Association, London, Journal*, 69(5):196–211, Aug. **1959.** fig., 25 refs., eqs. C (QB1.B75)—To understand the atmospheres of other planets one must study our own atmos-re first. The author quotes WEXLER'S summary of the data obtained by MÖLLER in connection h the radiation balance of the Earth. Results of calculations concerning the radiation balance in atmosphere on Earth, Venus and Mars are tentative and their interest lies in the application and blicability of the terrestrial meteorological data to the comparable atmospheres of Venus and Mars. udiness—besides grey-sphere temperatures—is of great importance to the radiation balance of the osphere. It is necessary to form an idea of the proportions of the cloud-covered and clear sky r the surface of the planet. *Subject Headings:* **1. Planetary radiation balance 2. Venus 3. Mars.** *K.* Ⓢ

12I–100 551.510.536:523.4 551.510.41:546.291

Firsoff, V. A. (*Glastonbury, Somerset, England*), **Dissipation of planetary atmospheres.** *Science*, Wash., D. C., 130(3385):1337–1338, Nov. 13, **1959.** 4 refs., 2 eqs. **DLC**—The author amends Jeans' theory of molecular dissipation (which assumes isothermal conditions) by revealing three factors, in addition to temperature, which must be taken into account. An interesting theoretical discussion concerning these factors and a mathematical example conclude the article. *Subject Heading:* **1. Dissipation of planetary atmospheres.**—*A.J.M.* Ⓢ

12I–101 551.58:523.4:574.6

Gadomski, Jan (*Warsaw. Univ. Obs.*), **Fünf Arten von ökosphärischen Planeten.** [Five types of ecospheric planets.] *International Astronautical Congress, 9th, Amsterdam, Aug.* 1958, *Proceedings*, Vol. 2:785–793, issued **1959.** 3 figs., 4 tables, 2 refs., 13 eqs. English, German and French summaries. **DLC** (TL787.I44)—The surroundings of every star can be divided—after appropriate mathematical considerations—into five different spheres of space where planets of different ecospheric types can exist, namely: 1) the sphere of the "restricted" planets with an "ecospheric belt" upon the "daylight surface" only; 2) the sphere of the "polar" planets with swift rotations which generally are "overheated" by their sun, but can show ecological conditions in their polar regions; 3) the vertical ecosphere of the fast-rotating animated planets; 4) the sphere of the "equatorial" fast-rotating planets which can have ecological conditions only in their tropical regions; and 5) the sphere of the unanimated planets which do not offer any conditions for organic life because of their low surface temperature. (*Same item as* 11.10–101, *Met. Abs.*) *Subject Headings:* **1. Planetary climates 2. Life on planets 3. Ecospheres.**—*Author's abstract.*

12I–102 550.3(02) 523.5 551.510:523.7

†**Handbuch der Physik, Band 52, Astrophysik III, Das Sonnensystem.** (Encyclopedia of Physics, Vol. 52, Astrophysics, Pt. III, The solar system.) Berlin, Springer-Verlag, **1959.** 601 p., 225 figs., tables, refs. at end of most ch., numerous eqs. Subject indexes in German and in English. (All articles abstracted separately. For listing of contents, *see* 10(11):1777, Nov. 1959, *Met. Abs.*) **DLC** (QC21.H327), **DWB** (551.03 H236)—This third volume, on astrophysics, contains major review articles summarizing existing knowledge through 1958 and presenting basic data in graphs and tables on the **Solar photosphere** by LEO GOLDBERG and A. K. PIERCE, on the **Structure and dynamics of the solar atmosphere** by CORNELIUS DE JAGER, on the **Atmospheres of the planets by** HAROLD UREY (*see* item 12I–107), on **Planetary interiors** by WENDELL C. DE MARCUS (*see* item 12I–98), on **Radio echoes from sun, moon and planets** by FRANK J. KERR, on **Comets** by KARL WÜRM and on **Meteors** by FRED L. WHIPPLE. Extensive and detailed subject indexes give, in a straight forward manner, the ideas contained in the contents, not only in words but also in phrases, in English-German and German-English, thus constituting a two-way glossary as well as index. The chapter on the Structure and dynamics of the solar atmosphere, itself, constitutes a textbook (p. 80–362) giving information and data on every aspect of quiet and disturbed photosphere (sunspots, faculae, flares, filaments, prominences, corona, radio emissions, rotation, solar cycle and solar-terrestrial relations). The article on Planetary atmospheres covers the Earth, Venus, Mars, Mercury, Moon and other satellites. All articles are in English except the one on Comets by K. WÜRM. (*Same item as* 11.4–1, April 1960, *Met. Abs.*) *Subject Headings:* **1. Handbook of Physics 2. Astrophysics 3. Solar atmosphere 4. Planetary atmospheres 5. Meteors. I. Flügge, S.** (*ed.*).—*M.R.*

12I–103 551.506.22:551.507.362:551.524.7:551.510.3 523.42

Jastrow, Robert, (*N.A.S.A., Wash., D. C.*), **Outer atmospheres of the earth and planets.** *Journal of Geophysical Research*, Wash., D. C., 64(11):1789–1798, Nov. **1959.** 7 figs., 29 refs., 2 eqs. **DLC**—The first paragraph briefly summarizes the salient facts about the outer atmosphere of Mars and Venus. This is followed by a survey of the lunar atmosphere. Here the author refers to recent calculations, which show the lunar atmosphere seriously reduced by the effects of the solar wind. The measurement of temperature and density in the terrestrial atmosphere was one of the most interesting results of the IGY upper atmosphere program. The density of the atmosphere was determined from satellite tracking data, and also by rockets. The temperature can be determined indirectly from the altitude dependence of the density measurements. Further, the disagreement of rocket and satellite results, the effect of the Van Allen belt, atmospheric models and the origin of the aurora are discussed. (*Same item as* 11J–79, Oct. 1960, *Met. Abs.*) *Subject Headings:* **1. Planetary atmospheres 2. IGY research 3. Upper atmosphere density measurements 4. Upper air temperature measurements 5. Satellite tracking.**—*E.K.*

12I–104 551.1(

*†Jeffreys, Sir Harold, **The earth: its origin, history and physical constitution.** 4th ed. Cambridge, University Press, **1959.** 420 p. 10 plates, 30 figs., numerous tables and eqs., bibl.

402-420. Price: 75 sh. **DLC** (QE501.J4 1959). 1st ed., **1924.** 3rd ed., **1952.** Review by B. Gutenberg in *Nature*, London, 184(4692):1007–1008, Oct. 3, **1959.** Review by K. E. Bullen in *Australian Journal of Science*, Sydney, 22(7):305–306, Jan. **1960.** Review in *Geophysical Journal*, London, 3(2):282–283, June **1960.**—Many changes have been made in theories as to the origin and physics of the earth and planets since the first edition of this classic was published in 1924. Hence the 3rd (1952) and 4th editions it was necessary to omit several chapters on cosmogony (4 chapters the origin of the solar system) which were found in the first and second edition and to add much new material on seismology, the age of the earth, its thermal history, tidal friction, continental drift hypothesis, lunar surface, polar wandering, convection currents, creep microseisms, etc., especially the form of better quantitative data on which to base or reject hypotheses. Far more is known radioactivity, and dating is more precise (and established dates older than formerly). Chapters cover: 1) mechanical properties of rocks, 2) theory of elastic waves, 3) observational seismology, the theory of the figures of the earth and moon, 5) observational figures of earth and moon, stress differences in the earth, 7) variation of latitude and bodily tide, 8) tidal friction, 9) age of earth, 10) thermal history of earth, 11) origin of surface features of earth and 12) special problems. Appendices give critical tables on stress differences, cooling of a sphere, long-period tides, etc. A voluminous bibliography, valid throughout, is included along with good author and subject indexes. (*Same item as* 11.9–7, *Met. Abs.*) *Subject Heading:* **1. Origin of earth.**—*M.R.*

12I–105 523.164.3:621.396.8

Smith, Alex G. and Carr, T. D. (*Dept. of Physics, Univ. of Florida*), **Radio-frequency observations of the planets in 1957–1958.** *Astrophysical Journal*, Chicago, 130(2):641–647, Sept. **1959.** figs., 7 refs. **DWB, DLC**—Analysis of all the available observations, including data obtained at is Observatory during the 1957–1958 apparition, indicates that the Jupiter radio sources continue rotate with a uniform period of $9^h55^m28^s8$. Measurements of the polarization of the radiation em to confirm the existence of a Jovian magnetic field. Radio observations of Venus and Uranus ve given negative results, whereas there is some evidence of sporadic radiation from Saturn. (*Same item as* 11.9–83, *Met. Abs.*) *Subject Heading:* **1. Radio observation of planets.**—*Authors' stract.*

12I–106 523.164.3

Smith, Harlan J., **Non-thermal solar system sources other than Jupiter.** *Astronomical Journal*, ew Haven, Conn., 64(2):41–43, March **1959.** 8 refs. **DLC**—Following the discovery of strong on-thermal radiation from Jupiter investigations have been made to find out if other sources of on-thermal meter-wave radiation are present in the solar system. This paper reports briefly three ch investigations carried out with regard to comet Arend-Roland, Venus and Saturn. In each se the observations are not sufficiently clear-cut to establish any of the three as a non-thermal diation source. *Subject Heading:* **1. Radio emission from solar system.**—*I.S.* Ⓢ

12I–107 551.510:523.4

*†Urey, Harold Clayton, **The atmospheres of the planets.** *Handbuch der Physik*, Berlin, 52:363–8, **1959.** 3 figs., 11 tables, bibliog., p. 415–418, 24 eqs. **DWB**—This detailed review of knowledge the planets' atmospheres takes up in order the Earth, Venus, Mars, Mercury, the Moon and other tellites and planets, their chemical constituents, energy balance, physical constants, various models, e escape of H_2 and He, history of the atmosphere and origin of life, if any. The bibliography is ry complete through 1958. Tabular data are arranged systematically and conveniently for ference purposes. (*Same item as* 11.6–93, *Met. Abs.*) *Subject Headings:* **1. Planetary atmospheres Atmospheric composition 3. Atmospheric models 4. Origin of atmosphere.**—*M.R.*

12I–108 523.4:523.152.2

Wildt, Rupert (*New Haven, Conn.*), **Das Innere der Planeten.** [The core of planets.] *Naturissenschaftliche Rundschau*, Stuttgart, 12(5):165–170, May **1959.** 4 figs., 11 refs. **DWB, DLC**—he measurement of compressibility of solid hydrogen and helium, up to 20,000 atmospheres, is ecessary for the knowledge of the core of the Jupiter-type planets. The knowledge of relation of essure, and density in bodies of higher mean density is not advanced as far as to warrant a theory, fferent from the traditional one, on the core of the Earth-type planets. It is plausible that the ydrogen and helium gas of Jupiter is condensed to an ocean-like liquid form on its surface. Diaams show the group of planets distinctive according to the relation of their density and mass; the nsity of isothermal atmospheres of pure hydrogen, and the relation of mass and radius for balls of lid hydrogen. The bibliography lists the theories discussed. (*Same item as* 11.9–84, *Met. Abs.*) *ubject Headings:* **1. Planetary cores 2. Interstellar medium.**—*O.T.*

1960

12I–109 551.510,536:523.4 551.510.41:551.510.3

Brandt, John C. and Chamberlain, Joseph W. (*both, Yerkes Obs., Williams Bay, Wisc.*), **Density of neutral gas in a planetary exosphere.** *Physics of Fluids*, N. Y., 3(3):485–486, May/June **1960**. fig., 10 refs., 5 eqs. **DWB**—Öpik and Singer (*see* item 12I–133) have recently presented a theory for the distribution in a planetary exosphere of the ballistic component of density (i.e., that part which is emitted from the critical level or base of the exosphere). They ignore the satellite component (i.e., those particles with orbits that do not intersect the critical level). The purpose of this note is to show that the treatment of the ballistic component by Öpik and Singer is not strictly correct, and that their neglect of the satellite component in calculations of the neutral hydrogen distribution for the earth's atmosphere is physically unrealistic. *Subject Headings:* **1. Model atmospheres 2. Planetary exospheres.**—*From authors' introduction.* Ⓢ

12I–110 523.164.

†Burke, B. F., **Noise of planetary origin.** (In: Menzel, Donald H., ed., **The radio noise spectrum** Cambridge, Mass., Harvard Univ. Press, **1960**. p. 129–140. 4 figs., 15 refs.) **DWB** (621.3841 M551ra), **DLC**—A discussion of thermal and nonthermal noise of planetary origin. Venus is a source of thermal noise while Jupiter and Earth are sources of nonthermal noise. The characteristics of each are described. Interferometer records of noise bursts are shown. Interpretation of the thermal component is aided by a better understanding of the physical processes involved, but must wait for more complete, and by no means easy, radio observations. The nonthermal radiation presents first of all an interpretational problem, although more observations of the complex spectral, polarization, and time-varying properties of the radiation are also required, before speculations can become theories. Observations of the thermal component require the services of the largest steerable paraboloids, coupled with the most refined receiving equipment. The noise bursts from Jupiter, can be observed with the simplest of antennas and receivers, although other planets, if they prove to be sources of nonthermal noise, will undoubtedly require larger antennas. R. M. Bracewell asked about the possibility of nonthermal noise from Venus. Burke pointed out that Dr. Erikson and he tried for a month, getting a good record every day, with completely negative results. *Subject Headings:* **1. Radio emission from planets 2. Radio noise.**—*E.Z.S.* Ⓢ

12I–111 551.507.362.1:523.

Chapman, Dean R. (*Ames Res. Center, Moffett Field, Calif.*), **Deceleration during entry into planetary atmospheres.** *International Symposium on the Physics and Medicine of the Atmosphere and Space, 2nd, San Antonio, Texas, Nov.* 1958, *Proceedings*, pub. N. Y., John Wiley, **1960**. p. 339–351. 8 figs., 4 refs., 5 eqs. **DLC, DWB** (M86:612 I612ph)—An analytical method is applied to survey the deceleration problem for shallow entries into planetary atmospheres. Only shallow entries are considered inasmuch as steep entries would result in decelerations too severe to be considered for manned entry. Three topics are discussed: 1) the dependence of deceleration on atmospheric conditions, 2) a method of alleviating the onset of deceleration following a period of weightlessness and 3) the effect of lift-drag ratio on deceleration for entry into various planets. Deceleration time curves for entry into Mars, Venus and Jupiter are shown and discussed. The planet Jupiter is not of comparable interest to Mars and Venus insofar as manned entry is concerned. *Subject Headings:* **1. Deceleration-time curves 2. Planetary entry studies.**—*E.Z.S.* Ⓢ

12I–112 551.593.5:551.510:551.501

*Coulson, Kinsell L.; Dave, Jitendra V. and Sekera, Zdenek, **Tables related to radiation emerging from a planetary atmosphere with Rayleigh scattering.** Berkeley, Univ. of California Press, **1960**. 548 p. 10 p. of text (pref.). Almost entirely tables. Price: $12.50. **DLC**—A large volume devoted to extensive tables of downward and of upward radiation from the bottom and the top, respectively, of the atmosphere for 7 values of optical thickness τ, 7 values of zenith distance of the sun μ_0, 16 values of zenith distance of the diffuse radiation μ, 7 values of azimuth angle of the diffuse radiation from the sun's vertical ϕ (0°, 30°, 60°, 90°, 120°, 150°, and 180°) and 3 values of ground reflectivity A (0.00, 0.25 and 0.80). The parameters for which the above values are tabulated are 1) total intensity I, 2) Stokes parameter Q, 3) Stokes parameter U, 4) degree of polarization P, and 5) angle X between plane of polarization and vertical plane at the given azimuth for the upward and the downward radiation, respectively. In the 10 sets of tables there are 142,688 values out of a possible 263,424. The tables are arranged in a convenient form and bound in high quality binding with explanations and background theory in preface. The calculations are based on an exact solution by Chandrasekhar to the Rayleigh transfer problem (1871), using as an aid G. G. Stokes' paper **On the composition and resolution of streams of polarized light from different sources (185** for the case of reflected and transmitted light in a plane-parallel atmosphere. It is also possible to obtain by subtraction from observed distributions the nonmolecular component of skylight. (*Sa*

m as 11.10–2, *Met. Abs.*) *Subject Headings:* **1. Rayleigh scattering tables 2. Radiation from** **netary atmospheres 3. Sky light polarization 4. Radiation tables. I. Stokes, G. G. II. Chan-** **asekhar, S.**—*M.R.*

12I–113 525.22 551.521.14

Dzhasybekova, E. K.; Kazachevskiĭ, V. M. and Kharitonov, A. V. (*all, Astrophysical Inst., cademy of Sciences, Kazakh SSR*), **Determination of the earth's albedo.** *Soviet Astronomy AJ,* ew York, 4(1):125–128, July/Aug. **1960.** fig., 2 tables, 12 refs. **DLC.** Transl. of their **Opre-** **lenie al'bedo zemnogo shara,** in *Astronomicheskiĭ Zhurnal,* Moscow, 37(1):131–134, Jan./Feb. **60. DLC**—The article contains a short exposition of the principle applied in determining the bedo of the earth by observations of the earthlight on the moon, with a brief description of the strumentation and procedure used in the observations. Results and description of laboratory udies of the instrument are also given. Albedo values for 17 dates are tabulated, with the geo- aphic position of the moon indicated for each date. The mean value for the albedo was found be 0.391±0.014. An accompanying table gives all known determinations of the earth's albedo. *ubject Heading:* **1. Albedo of Earth (lunar).**—*Authors' abstract.* Ⓢ

12I–114 551.510.5:523.43:523.07

Fulton, John D. (*Arctic Aeromedical Lab., Seattle, Wash.*), **Survival of terrestrial microorganisms der simulated Martian conditions.** *International Symposium on the Physics and Medicine of the tmosphere and Space, 2nd, San Antonio, Texas, Nov.* 1958, *Proceedings.* Pub. N. Y., John Wiley, **60.** p. 606–613. 17 refs. **DLC, DWB** (M86:612 I612 ph)—A brief discussion of early and cent techniques for the study of extraterrestrial bodies with a view to determining whether or not e exists there. In relation to studies of Mars, direct and indirect methods are explained. Lab- atory experiments designed to simulate the presumed environmental conditions of Mars seem to ow that terrestrial living forms can exist there under a combination of conditions. The ultimate al is to determine if simple forms of terrestrial life can not only survive and multiply but also ntribute some product or perform some function required to support man in specific extraterrestrial vironmental situations. *Subject Headings:* **1. Life on planets 2. Mars.**—*E.Z.S.* Ⓢ

12I–115 551.521.18

Goldstein, J. S. (*Bandeis U., Waltham, Mass.*), **The infrared reflectivity of a planetary at-** **osphere.** *Astrophysical Journal,* Chicago, 132(2):473–481, Sept. **1960.** 9 refs., 39+7 eqs. **DWB, LC**—The reflectivity equation for a non-homogeneous stratified atmosphere is solved by an iteration ocedure. This method of solution permits averaging over frequency in a straightforward manner itable for use in the infrared absorption bands, where the exponential law of attenuation does not ld for detectors of finite bandwidth. The emission of such an atmosphere is also shown to be pressible in terms of the measured attenuation function. The separate consideration of emission d scattering will be valid only in a limited spectral region. *Subject Headings:* **1. Atmospheric ffusion 2. Infrared bands.**—*Author's abstract.* Ⓢ

12I–116 551.591.3:523.4

Isaacs, John D. and Tyler, John E. (*both, Scripps Inst. of Oceanography, Univ. of Calif.*), **On the** **bservation of unresolved surface features of a planet.** *Astronomical Society of the Pacific, San rancisco, Publications,* 72(426):159–166, June **1960.** 6 figs., plate, 2 refs. **DLC**—There is a direct lationship between the unresolved features of an illuminated surface and the brightness and color the light that it scatters. Calculated brightness changes of three idealized surfaces are considered d graphically illustrated. The principles derived from this consideration are applied to the study the unresolved features of a planet. As an example and test, a simple cylindrical model of a planet ith asymmetric sand dunes is constructed and the effect of these dunes on the unresolved brightness observed. The expected relationships and results of the observation are presented and graphically ustrated. *Subject Headings:* **1. Brightness changes 2. Planetary features.**—*I.S.* Ⓢ

12I–117 523.2:523.4:016

†Kiess, Carl C. and Birney, Dion Scott, **Recent studies of the known physical characteristics the moon and the planets.** Georgetown University. Georgetown College Observatory, Contract F 19(604)-7203, (Unnumbered report), Dec. **1960.** 18 p. Bibliographies with introductory text. mmary of recent literature, to supplement *Monograph* No. 12, July 1958, **Known physical haracteristics of the Moon and the planets,** by C. C. Kiess and K. Lassovzsky. (Its *Georgetown ollege Observatory Monograph* No. 15.) **DWB**—The purpose of this report is to provide references 19 in all) on recent work concerning the Moon, Mars, Venus, and Jupiter. A brief sketch of each these planets covering surface features, atmosphere, mechanics, etc. serves as the basis for organiz- g and relating the references. *Subject Headings:* **1. Planetary bibliographies 2. Lunar bibliog- phies.**—*A.J.M.* Ⓢ

12I–118 523.4

Kopal, Z. (*Dept. of Astronomy, Univ. of Manchester*), **Mapping the planets.** *New Scientist*, London, 8(212):1511–1513, Dec. 8, **1960.** 4 figs.—This article discusses in a general manner the various difficulties met with in attempts to map the planets. There are two major obstacles, the first is that of distance and the second that of the distortion effects both of the planetary and terrestrial atmospheres. The observation of Venus is complicated by the fact that it is an interior planet and therefore only a small portion of its surface is visible when the planet is nearest to earth. In addition Venus is surrounded at all times by cloud so that nothing can be determined relating to its topographical features. Mars can be investigated much more easily. Its atmosphere is not so dense as that of the earth and does not therefore present very much difficulty. A recent map of Mars is reproduced and its major features are discussed. *Subject Headings:* **1. Planetary atmospheres 2. Planetary topography.**—*R.B.* Ⓢ

12I–119 523.2:523.3:523.42/3

Kuiper, Gerard P. (*Yerkes & McDonald Obs., Univ. of Chicago and Texas*), **The environments of the Moon and the planets.** *International Symposium on the Physics and Medicine of the Atmosphere and Space, 2nd, San Antonio, Texas, Nov.* 1958, *Proceedings.* Pub. N. Y., John Wiley, **1960** p. 577–583. 9 refs. **DLC, DWB** (M86:612 I612ph)—A brief discussion on the environments of the Moon, Venus and Mars. The origin of the Moon and its surface features are discussed. Recent measurements of the surface temperature of Venus at the Naval Research Laboratory, giving approximately 300°C, strengthened the conclusion that water on Venus is exceedingly rare. Venus' cloud cover may be composed of C_3O_2 polymerized, produced in the CO_2 atmosphere by solar ultraviolet and particle radiations. The author adds one point to his previous (1952) summary about Mars. Careful studies of Martian colors during 1954, 1956 and 1958 have shown the colors to be almost neutral gray with possible very small admixtures of moss green and brown. These colors refer to the dark areas. Tentative interpretation on the nature of these dark areas is that they are similar to the lava fields on the Moon and on Mercury and that the variable visibility is due to variable amounts of overlying dust that can be blown away as happens on terrestrial lava fields in desert regions. It is quite possible that some primitive vegetation occurs on these fields and it is responsible for the traces of color which one suspects at times. *Subject Headings:* **1. Lunar environment 2. Martian environment 3. Venus environment.**—*E.Z.S.* Ⓢ

12I–120 521.86:523.81 523.82

Scheffler, H., **Die Ursache der Helligkeitsänderungen von Fixsternen bei deren Bedeckung durch Planeten.** [Reason of brightness variation of fixed stars during occultation by planets.] *Die Sterne*, Leipzig, 36(1/2):1–6, Jan./Feb. **1960.** 2 figs., 7 refs. **DLC**—In contrast to occultation of a star by the moon, occultation of a fixed star by another planet is not immediate. W. W. Campbell observed during occultation of 7 aquarii by Venus, on March 2, 1918 that the diminishing of the brightness degree was going over 1½ minute. The author cites some other cases of this fact. A. Pannekoek has given the actual reason of brightness variation in 1903 and C. Fabry in 1926. The theory of Pannekoek is given. The phenomenon has also been discussed by Hoffmeister, Laml. and Moore. *Subject Headings:* **1. Star occultation by planets 2. Star brightness variations** —*A.V.* Ⓢ

12I–121 523.164

Schmidt, H., **Planetarische Radiostrahlung.** [Radio emission from planets.] *Die Sterne*, Leipzig, 36(3/4):81–83, March/April **1960. DLC**—In agreement with the 101st session of the American Astronomical Society a symposium was organized in Dec. 1958 at Gainesville. The author shows the observations made in the field of radio astronomy by K. L. Franklin, B. Burke, H. Tatel, T. D. Carr and others. From the results of various research works the conclusion was reached that besides the sun, only Jupiter may be considered as a radio source; Venus, Saturn and the comets need a more developed research. The author gives some results of measurements: (Venus by Mayer—3.15 cm and 9.4 cm wave; (Jupiter) by MacClain and Sloanaker—10.3 cm. Observations of Saturn in 1958 have been without results. (*Same item as* 11.12–63, Dec. 1960, *Met. Abs.*) *Subject Headings:* **1. Radio astronomy 2. Radio emission from planets.**—*A.V.*

12I–122 523

Singh, R. P. and Goel, N. S. (*both, Indian Inst. of Technology, Bombay*), **The physical state of condensed matter and the radius of a cold planetary body.** *Zeitschrift für Astrophysik*, Berlin, 50(4):269–277, **1960.** fig., table, 16 refs., 18 eqs. **DLC**—The physical state of matter on a cold planetary body has been investigated in the light of Bohm-Pines' theory of plasma oscillations in metals. It has been shown that the radius of a planet depends on the degree of ionization of the condensed matter. The logarithms of the calculated radii of various planets are plotted again

e logarithm of the mass of the planet expressed as a fraction of solar mass. A comparison of the culated and observed radii gives an idea of the mean molecular weight or the degree of ionization d hence also of the internal composition. (*Same item as* 11L–137, Dec. 1960, *Met. Abs.*) *Subject eading:* **1. Planetary mass.**—*Authors' abstract.*

12I–123 523.7:551.524:523.43

Sredinskiĭ, S. N., **Sovpadenie vysoty Solntsa pri sezonnykh iavleniiakh na Marse i na Zemle.** oincidence of heights of the Sun with seasonal phenomena of Mars and on the Earth.] *Vsesoiuz-e Astronomo-Geodezicheskoe Obshchestvo, Biulleten'*, No. 27(34):15–19, **1960.** 4 tables, 6 refs. t so in: *Priroda*, Moscow, No. 12:87–88, Dec. **1960.** fig., table, 2 foot-refs. **DLC**—The appearance green colors on Mars is associated with solar elevations of 52° or more. Phenological data for rious locations in Russia are tabulated, showing that the appearance of plant cover corresponds to nilar solar elevations. Another tabular comparison shows that reduction of the polar caps on ars and snow melt in Siberia occur at the same solar elevations. It would appear, therefore, that mmer temperatures on Mars are the same as on Earth, even though the former planet is 1½ times rther from the Sun than the latter. This may be explained by the greater length of the Martian mmer, and the fact that the Sun stands 1½° higher on Mars than on Earth during summer. *Subject eadings:* **1. Planetary phenological studies 2. Solar effects on planetary climates 3. Mars.** *G.T.* Ⓢ

12I–124 523.7 525.723 551.593

Tikhov, G. A., **Osnovnye trudy.** [Principal works.] Alma-Ata, Akademiia Nauk Kazakhskoĭ SR, 1954–1960. 5 Vol. Vol. 1, **Astrofizika, 1897–1919.** Issued **1954.** 333 p. Vol. 2, **Astrofizika atmosfernaia optika, 1910–1945.** Issued **1955.** 381 p. Vol. 3, **Astrofizika, 1912–1956.** Issued **1957.** 233 p. Vol. 4, **Astrobotanika i astrofizika, 1912–1957.** Issued **1959.** 255 p. Vol. 5, **otanika, Mars, Zhizn' vo Vselennoĭ, fizika, astrofizika i atmosfernaia optika, 1912–1958.** Issued **960.** 338 p. At head of t-p.: Akademiia Nauk Kazakhskoĭ SSR. port., figs., tables, refs., eqs. roughout. **DLC** (QB3.T5)—This collection of some 100 papers on astrophysics, atmospheric ptics and planetary science, published over a period of 60 years, represents the author's work first Pulkovo Observatory and later at Alma Ata where he founded a Section of Astrobotany. Vol. 1 ntains papers on stellar astrophysics, with emphasis on the propagation of light in the interstellar edium. Vol. 2 deals with planetary photography (including sample photographs of Mars and turn in black-and-white and color), reflection of light by the Moon and Earth, and atmospheric ptics (scintillation, scattering, refraction, etc.). Vol. 3 is on solar observations (especially studies the corona during eclipses), stellar spectroscopy and the deflection of light in stellar gravity fields. ol. 4 contains some of the author's works on astrobotany (spectroscopic study of plants), astro-ology (principles of life in the Universe) and instrumental and observational aspects of photo-aphic photometry and its application to planetary studies. Vol. 5 is divided into four sections. he first (p. 3–28) contains papers on spectroscopy of plants; the second (p. 29–159) on the planet ars, its atmosphere, climate and suitability for organic life. The articles and polemic writings in is section were published both in the U.S.S.R. (mostly in the Proceedings of the Section of Astro-otany, Acad. of Sci., Kazakh SSR) and abroad. The third section (p. 160–236) deals with general roblems of astrobiology and the fourth (p. 237–337) mainly with atmospheric optics. (*Same item as* 2.8–1, *Met. Abs.*) *Subject Headings:* **1. Astrophysics 2. Atmospheric optics 3. Mars 4. Sun's orona. I. Akademiia Nauk Kazakhskoĭ SSR.**—*G.T.*

12I–125 523.3:523.43

Tombaugh, Clyde W. (*State College, New Mexico*), **Comparison of lunar and Martian features.** *unar and Planetary Exploration Colloquium, Jan.* 12, 1959, *Proceedings*, 1(4):38–41, pub. **1960.** figs. **DWB, DLC**—Comparing various photographs of Mars and the Moon the similarities between anals and rays suggest the possibility of similar origin, by meteoric impact. A temporary atmos-here might exist on the moon causing the moisture as a prerequisite to vegetation. *Subject Head-ngs:* **1. Planetary geomorphology 2. Lunar atmosphere 3. Mars.**—*O.T.* Ⓢ

1961

12I–126 551.510.41:551.510.53:523.4

Biutner, E. K., **O vremeni ustanovleniia statsionarnogo kolichestva kisloroda v atmosferakh lanet, soderzhashchikh vodianoĭ par.** [Time in which a stationary amount of oxygen is established the atmosphere of planets containing water vapor.] *Akademiia Nauk SSSR, Doklady*, 138(5): 050–1054, June **1961.** table, 5 refs., 7 eqs. **DLC**—An answer to the question whether an accumula-ion of an amount of free O_2 in the terrestrial atmosphere before the origin of life has been possible y photodissociation of water vapor is sought by evaluating the time necessary for the accumulation f a specified amount of O_2. The equations derived and solved indicate that 60 million years have

passed before the terrestrial atmosphere was provided with the present amount of O_2 from interaction of H_2O with solar radiation. It is assumed that conditions for life on Earth developed when a certain amount of O_2 was present in the terrestrial atmosphere. Photodissociation of CO_2 is also considered and the most active dissociation is assumed to occur at 115 km altitude. *Subject Headings:* **1. Atmospheric evolution 2. Planetary atmospheric composition 3. Oxygen photochemistry.**—*S. Nowinska.* Ⓢ

12I–127 523.4:551.593

Firsoff, V. A., **Visual observations of the planets with colour filters—illusion and reality.** *Discovery*, London, 22(6):230–236, June **1961.** 5 figs. illus. **DLC**—The visual use of color filters in planetary observations and the advantages of this new practice are discussed. The author points out that the planetary astronomer has to contend with the attenuation of the color by the atmosphere. Handicaps of the unaided eye are overcome with monochromatic filters which will show intensities of a single color. For finding the true color of a planetary marking, tri-color filters are recommended which enable the comparison of the intensities of the three basic colors. Drawings of Mars and Venus illustrate the results obtained by the visual use of color filters. *Subject Headings:* **1. Planetary observations 2. Atmospheric optics.**—*E.K.* Ⓢ

12I–128 551.510:523.4

†Gilvary, J. J. (*Allis-Chalmers Mfg. Co., Milwaukee, Wisc.*), **Escape of planetary atmospheres. Pt. 1, Escape layer.** *Physics of Fluids*, N. Y., 4(1):2–7, Jan. **1961.** fig., 18 refs., 35 eqs. Also **Pt. 2, Lifetimes of minor constituents.** *Ibid.*, 8–12, 2 figs., table, 14 refs., 32 eqs. **DWB**—The critical layer for thermal escape of a planetary atmosphere is treated on a model in which an isothermal exosphere at high temperature merges within a narrow zone (the endopause) of varying temperature into the remainder (the endosphere) of the atmosphere, isothermal above the level of which mixing stops. Only one major constituent of the atmosphere is considered, and constant scale heights are assumed for the exosphere and for the endosphere above the level at which diffusion sets in. The height of the escape layer is evaluated analytically by considering the pressure balance at the base of the exosphere. The result permits one to determine explicitly the amount (the concentration or the number of molecules above unit area) of a minor constituent at the critical level taking thermal diffusion across the endopause into account. The predicted height of the escape layer as determined from a model atmosphere of Nicolet shows essential agreement with the height inferred directly by means of the number density, scale height, and collision diameter. In Pt. 2 it is shown that the essential parameter determining the escape rate is the ratio to the exospheric scale height of the radius of the escape layer as measured from the planet's center. *Subject Headings:* **1. Dissipation of planetary atmospheres 2. Atmospheric escape layer.**—*Based on author's abstracts.* Ⓢ

12I–129 551.510.3:551.510.536:523.7

Herring, J. and Kyle, L. (*both, NASA, Wash., D.C.*), **Density in a planetary exosphere.** *Journal of Geophysical Research*, Wash., D. C., 66(6):1980–1982, June **1961.** fig., 6 refs., 8 eqs. **DLC**—A brief review of Öpik-Singer theory (*see* item 12I–133) of the exosphere is followed by several comments. Although their theory does seem to give a valid justification for its use in the case of the neutral component of the exosphere, it should be stressed that the ionized and bound orbit components must be included for a complete description of a planetary exosphere. An alternative derivation of the formula for density distribution based on LIOUVILLE'S theorem is presented. The authors obtain a relatively simple analytic expression for the density distribution. The density formula then enables the authors to calculate the depth of the exosphere. This quantity is relevant to calculations of the escape of a planetary atmosphere. *Subject Heading:* **1. Planetary exosphere density.**—*E.Z.S.* Ⓢ

12I–130 523(02)

Inglis, Stuart J., **Planets, stars, and galaxies: an introduction to astronomy.** New York, Wiley and Sons, **1961.** 474 p. figs., tables, refs. Price $6.75. **DLC** (QB43.I5)—This richly illustrated and highly readable textbook emphasizes three major aspects of astronomy: 1) the appearance of the celestial sphere, 2) observation as the basis of all astronomical concepts and theories and 3) these concepts and theories. The occurrence and characteristics of atmospheres are treated in connection with various celestial bodies such as: giant stars, white dwarfs, Mercury, Moon, Venus, Mars, Jupiter and Venus. Methods of observation are discussed and some of the significant results obtained are presented. *Subject Headings:* **1. Astronomy textbooks 2. Planetary textbooks.**—*E.K.* Ⓢ

12I–131 523.164

Mayer, Cornell H., **The temperatures of the planets.** *Scientific American*, New York, 204(5):58–65, May **1961.** 11 figs., table. **DWB, DLC**—This article is a report on radiometric observation

lanetary radiation. Basic facts about radiation (e.g., how it arises from temperature; tempera- equilibrium; etc.) and its connection with a planetary atmosphere are enumerated. Detection his radiation with suitable instrumentation is covered next. Finally, results of observations of us, Mars, Jupiter, and Saturn are discussed, except for Saturn, in some detail. *Subject Headings:* **lanetary radiation 2. Radiometry of planets 3. Planetary temperatures.**—*A.J.M.* Ⓢ

12I–132 551.521.17:525.7:523.4

†Nicolet, Marcel, **Effets de l'ultraviolet lointain solaire sur l'atmosphère de la terre et des autres ıètes: rapport introductif.** [Effects of the solar far ultraviolet upon the atmospheres of the Earth the other planets; a preliminary report.] *Société Royale des Sciences de Liège, Mémoires*, 5th , Vol. 4:319–368, [1961?]. In 8°. 18 figs., 2 tables, 76 refs., 18 eqs. **DLC.** Reprinted as *gium. Institut Royal Météorologique, Contributions*, No. 66, **1961. DWB**—Solar constants are ved for all planets as functions of their distances from the Sun. Absorption cross sections for air, N and O and ionization cross sections for CO_2, CO, CH_4 and NH_3 are presented in the spectral ge of X-radiation. From these, estimated values of ionization coefficients are derived for every net. Ionization cross sections are further presented in the spectral range of ultraviolet radiation O, N, A, CO_2, CO, H_2O, NH_3 and CH_4 and absorption, ionization and dissociation processes olving these gases and UV radiation are discussed. Finally the effects of far UV radiation in the ospheres of the Earth and of each individual planet are considered. It is concluded that a) the ucture of planetary ionospheres is determined essentially by the composition of the planet, al- ugh distance from the sun plays an important part; b) the behavior of planetary thermospheres ssociated with the thermal balance depending on solar UV emission and infrared emission from planet, the latter being determined by the planet's physical structure; c) chemical reactions ulting from photodissociation and photoionization must be studied more thoroughly under oratory conditions before a quantitative application to planetary atmospheres can be attempted. search on planetary structure still requires many experimental and theoretical studies which not be replaced by space soundings; what's more, the latter may be useless unless certain basic wledge is already available. A valuable bibliography is appended. *Subject Headings:* **1. Solar iation effects on planets 2. Photochemistry of planets 3. Planetary ionospheres.**—*G.T.* Ⓢ

12I–133 551.510.3:551.510.536:523.4

Öpik, E. J. and Singer, S. F. (*both, Univ. of Md.*), **Distribution of density in a planetary exosphere, t. 1].** *Physics of Fluids*, N. Y., 2(6):653–655, Nov./Dec. **1959.** fig., table, ref., 17 eqs. **DWB, C. Pt. 2,** *ibid.*, 4(2):221–233, Feb. **1961.** 3 figs., 3 tables, 12 refs., 38 eqs. **DWB.** Also: **plement to Pt. 2.** Maryland. Univ. Dept. of Physics, Contract AF 19(604)3861, [Unnum- ed report], issued **1960.** 8 p. 12 refs. **DWB** (M21.32 06di)—Pt. 1 reports that a theory has n developed which gives the distribution of density with altitude for a planetary exosphere in the sence of local thermodynamic equilibrium. The results differ considerably from those conven- nally calculated on the basis of the hydrostatic equation. Pt. 2: In an isolated neutral exosphere ee components can be distinguished: (1) elliptic-ballistic; (2) hyperbolic-ballistic; (3) bound- iptic. Component (2) forms the escape flux which cannot be defined simply. The velocity tribution of all components is calculated as a function of altitude in the exosphere; one can thereby ess the importance of the bound orbits. Even with the bound orbits completely filled, according detailed balancing, the velocity distribution is non-Maxwellian; hence the barometric formula not be applied to determine the distribution of density. The absence of a Maxwellian distribution shown to exist at all levels above the reference level (base of the exosphere) and the effective etic temperature of the gas is shown to decrease with altitude. The "base of the exosphere" ms the dividing level between the barosphere and exosphere; its conventional definition has been examined and it is redefined to correspond to the level from which one-half of the escaping mole- es may escape without suffering any collisions. Numerical results for all components versus itude are given for neutral hydrogen and oxygen, applicable to the terrestrial exosphere. The tribution of bound orbits is estimated and shown to be minor at all levels. Bound orbits may be portant for the exospheres of the outer planets. The interplanetary gas may be considered as an ension of the solar atmosphere; however, caution must be exercised in treating it as an exosphere. the supplement the authors note that CHAMBERLAIN, JOHNSON and FISH, and BRANDT and HAMBERLAIN have performed researches with many elements in common with their own study on nsity in planetary exospheres, and also with many differences. A discussion and criticism of these ier researchers' contributions and a comparison of approaches and results are presented. *Subject adings:* **1. Planetary exosphere density 2. Dissipation of planetary atmospheres.**—*Authors' mmary and A.J.M.* Ⓢ

SUPPLEMENTARY MATERIAL

12I–134 551.501.776:551.576:525

Shapiro, Ralph, **A study of the behavior of large scale cloudmasses in the earth's atmospher** (In: Flagstaff, Arizona. Lowell Observatory, **The project for the study of planetary atmosphere** Contract AF 19(122)-162, Report No. 7, Dec. 30, **1950**–March 30, **1951.** p. 1–11.) **DWB**—A account is given of a brief investigation of the behavior and characteristics of the Earth's large sca cloud systems. Preliminary comparisons are made between the appearance of Jupiter and t probable appearance of the Earth as viewed from another planet. *Subject Headings:* **1. Clou observation 2. Upper atmosphere 3. Planetary atmospheres.**—*Author's abstract.*

12I–135 551.510:535.

Shaw, John H.; Burch, D. E.; Sloan, R. W. and Williams, Dudley (*all, Ohio State Univ. C lumbus*), **The emission spectrum of the Earth's atmosphere from 4μ to 22μ.** *Société Royale d Sciences de Liège, Mêmoires*, Ser. 4, 18:42–47, **1957.** 2 figs., 4 refs. **DLC, DWB** (P S678v)—T article indicates, very briefly, the type of equipment used, following which is a summary of t conclusions drawn from the observational data. The article concludes with a short discussion atmospheric ozone emission as observed in Columbus, Ohio and New Mexico. A typical spectru for Columbus is shown graphically. *Subject Headings:* **1. Emission spectra 2. Upper air observ tions.**—*A.J.M.*

12I–136 551.521.18:535.

Shaw, John H., **Infrared studies of the atmosphere.** Ohio. State Univ. Research Foundatio Contract AF 19(122)-65, Final Report, May 16, **1949**–Dec. 31, **1954.** Pub. Dec. 31, **1954.** 71 figs., tables, refs., eqs. Also: Shaw, J. H., Burch, D. E., et al, **Infrared studies of the atmosphere 1954–1957.** Its Contract AF 19(604)-1003, Final Report, Jan. **1958.** 44 p. 9 figs., 3 tables, 26 re Appended: Reprints of articles from various sources (all abstracted separately): Shaw, J. H.; Burc D. E.; Sloan, R. W. and Williams, Dudley: **The emission spectrum of the earth's atmosphere fro 4μ to 22μ** (*see* 12I–135). Burch, Darrel E.: **Infrared evidence for the presence of ozone in the low atmosphere.** Sloan, Raymond; Shaw, John H. and Williams, Dudley: **Thermal radiation from t atmosphere.** Shaw, J. H.: **Nitric oxide fundamental.** Burch, D. E. and Shaw, J. H.: **Infrar emission spectra of the atmosphere between 14.5μ and 22.5μ.** Birkland, J. W.; Burch, D. E. a Shaw, J. H.: **Some comments on two articles by Taylor and Yates.** Coburn, Theodore J.; Naraha Rao, K. and Nielsen, H. H.: **Combination band $\gamma 4+\gamma 5$ of acetylene.** Rossmann, Kurt; Naraha Rao, K.; France, W. L. and Nielsen, Harald H.: **Infrared spectrum and molecular constants of carb dioxide, Pt. 1–2.** Sloan, Raymond; Shaw, John H. and Williams, Dudley: **Infrared emission spe trum of the atmosphere** (*see* 7.2–158). **DWB** (M21.6 O37s)—The 1949–54 **Final Report** is a su mary of the 8 progress reports and 13 scientific papers published in technical journals (listed appendix) between May 1949 and Dec. 31, 1954. The work consisted in mapping the region fr 3 to 13 involving over 1600 absorption lines, 70% of which are found in the atmosphere (H_2O, C O_3, N_2O, CO, CH_4 and HDO). The amount of CO in the atmosphere was determined in deta Separate chapters discuss: 1) the infrared solar spectrum, 2) upper limits of atmospheric gas 3) the O_3 molecule, 4) nitric oxide fundamental, 5) absorption bands of N_2O near 4.5, 6) variations abundance of CO in atmosphere, 7) investigations of absorption by single lines, 8) thermal emissi by the earth's atmosphere, 9) scattering of near infrared solar radiation by atmosphere, 10) absorpti measurements with a long absorption cell. In the 1954–1957 **Final Report,** describes the 3-y program of investigating the atmosphere and atmospheric gases by infrared techniques. Stud completed under the Contract AF 19(604)-1003 are discussed in the following order: high-resoluti studies of infrared molecular bands; the infrared solar spectra (Shaw, Cummins); the infrar emission spectrum of the atmosphere; the abundance of atmospheric gases; the intensities and widt of CO lines; the radiation intensity from a point source in a semi-infinite medium; the mean-infrar spectrum of Mars; the apparatus for high-resolution infrared studies. In this material the variatio in abundance of atmospheric CO and N_2O at ground level have been studied. High-resoluti spectra of bands of CO_2, O_3, N_2O, NO, C_2H_2 and NH_3 have been analyzed. Measurements of t growth of single lines of CO have been made, and investigations of the emission spectrum of t earth's atmosphere in the region 4μ to 22μ and of the spectrum of Mars in the PbS region have be undertaken. (*Same item as* 12.2–322, Feb. 1961, *Met. Abstr.*) *Subject Headings:* **1. Infrar spectrum 2. Infrared spectroscopy. I. Williams, Dudley II. Nielsen, H. H.**—*M.R.*

12I–137 551.510.53 52

Stumpff, Karl, **Planet Earth.** Ann Arbor, Univ. of Michigan Press, **1959.** 191 p. 57 fi **DLC** (QB631.S713). Transl. of original German **Die Erde als Planet.** Berlin, Julius Spring **1955. DLC** (QB631.S7)—A general survey of various aspects associated with the Earth is present

his highly readable book. In Ch. 10 the terrestrial atmosphere, its height and density, the sical composition of atmospheric air, its temperature, the ionosphere and the correlation of air light are discussed. As far as the existence of an atmosphere is concerned, it has been stated certain conditions of surface gravity and surface temperature must be present before a planet retain it. On this basis the atmospheric conditions of the planets in the solar system are briefly yzed. *Subject Headings:* **1. Upper atmosphere structure 2. Upper atmosphere composition nosphere.**—*E.K.* Ⓢ

12I–138 551.510.41:551.1:523.4

Pereira, Flávio Augusto, **A evolução das atmosferas planetárias, especialmente a terrestre.** volution of the planetary atmospheres, especially the terrestrial.] São Paulo, José Olympio, **1946.** p. tables, 29 refs. In Portuguese, French, English and German summaries, p. 100–116. **DWB** urrent knowledge on the composition and evolution of atmospheres is summed up from works of r 130 authors. In the first chapter, which mainly deals with the composition of the present estrial atmosphere, data on the percentage of atmospheric oxygen at various locations, on the al quantity and vertical distribution of atmospheric gases and comparative data on the composi- n of the Earth's crust, the Sun and meteorites are presented. Factors determining the evolution he atmosphere, namely, gravitation and centrifugal force, and their effect on various atmospheric mponents are discussed in the second chapter. Ch. 3 is concerned with the evolution of planetary nospheres of the solar system. In Ch. 4 the composition of the Earth's atmosphere is examined various stages of its evolution throughout cosmic and geological time. (*Same item as* 5.5–82, *At. Abs.*) *Subject Headings:* **1. Atmospheric evolution 2. Atmospheric composition 3. Planetary nospheres.**—*G.T.*

12I–139 535.24:523.4

†Sharonov, V. V., **Fotometricheskoe issledovanie prirody planet i sputnikov.** [Photometric estigation of the nature of planets and satellites.] *Uspekhi Astronomicheskikh Nauk*, Moscow, 81–249, **1954.** 11 tables, 256 refs., 102 eqs. **DLC** (QB1.A175)—An outline is presented of the thods of photometry, including spectrometry, radiometry and polarimetry as applied to studies planets and of some of their satellites. Only integral photometry which consists in measurements brightness, stellar magnitudes and the phase curve (i.e., the variation of the planet brightness with phase angle) may be applied to satellites and the planets Uranus, Neptune, Pluto and Mercury. ta for these planets are tabulated. Surface photometry, measuring the brightness of various tors of the planet's disk involves some difficulties. Detailed data are given on the Moon, obtained integral and surface photometry, spectrometry and colorimetry. Some preliminary results from face photometry of Venus, Mars, Jupiter and Saturn are presented. The photometry of Saturn's gs gives interesting data on the variation of their brightness in relation to their inclination. *Subject adings:* **1. Planetary research 2. Planetary bibliographies 3. Photometry of planets.**—*S.N.*

12I–140 523.4:551.593.5

†Sobolev, V. V., **Teoriia rasseianiia sveta v planetnykh atmosferakh.** [Theory of scattering of ht in planetary atmospheres.] *Uspekhi Astronomicheskikh Nauk*, Moscow, 6:250–280, **1954.** figs., 13 tables, 30 refs., 71 eqs. **DLC** (QB1.A175)—A brief review of recently published Soviet search dealing with the theory of multiple light scattering in extended turbid media and applicable planetary atmospheres is presented. The equations in the case of a plane turbid medium illu- inated by parallel beams are derived and solved. A special method developed by V. A. AMBART- MIAN for determining the brightness coefficients is outlined. The theory of light scattering is plied to Jupiter, Saturn and with best results to Venus. A resulting comparative table of the attering coefficient of Earth and Venus is presented. *Subject Headings:* **1. Scattering of light Planetary atmospheres.**—*S.N.*

12I–141 523.4(023)

Branley, Franklyn Mansfield, **The nine planets.** Illus. by Helmut K. Wimmer. N. Y., Thomas . Crowell, **1958.** 77 p. figs., 9 refs. At head of t-p.: Exploring our Universe. **DLC** (QB601.B84) This book, written in popular style, covers general facts about all the planets in the first section. ccessive sections cover the nine planets, individually, presenting information on period of rotation nd revolution, composition, atmosphere, axial tilt, distance from sun, etc. *Subject Headings:* **Planetary textbooks 2. Solar system.**—*A.J.M.*

12I–142 523.164.3 523.164.8

Lovell, A. C. B. (*Univ. of Manchester, England*), **Moon and planets: concluding lecture.** (In: aris Symposium on Radio Astronomy, July–Aug. 1958, **(Proceedings)**, pub. Stanford Univ. Press, **959.** p. 75–78.) **DLC** (QB475.P26)—A summary of the 12 papers read during the session held n the Moon and planets at the Symposium. The summary contains discussions on: radar in-

vestigations of the Moon; the future of radar investigations of the solar system; the lunar atmosphere comets; thermal radio emission from the planets; and non-thermal radio emission from the planets Range discrepancies and the scattering processes are among the major items that need more study The implications of the new work on the radio echo investigations of the Moon are considered *Subject Headings:* **1. Planetary research 2. Lunar atmosphere 3. Radio emission from solar system 4. Radar investigation of solar system.**—*E.Z.S.* Ⓢ

12I–143 551.507.362.2:778.3:52

Fritz, S. and Wexler, Harry (*both, U. S. W. B., Wash., D. C.*), **Planet Earth as seen from space** (In: Kuiper, G. P. and Middlehurst, B. M. (*eds.*), **Planets and satellites.** Chicago, Univ. of Chi Press, **1961.** p. 1–11. 14 refs., 22 plates.) **DWB, DLC**—This chapter consists of 22 plates con taining 40 excellent photos and an interesting analysis of these photos. The photographs were taken by TIROS I, April–June 1960, and include parts of every continent but Antarctica. Th discussion includes a brief introduction dealing mainly with operational information on TIROS and detailed descriptions of the various surface and atmospheric phenomena that appear in th photographs, e.g., (land-water contrasts, deserts, mountains, cloud and cyclone patterns, etc.). plate showing a world map on which are indicated the areas covered by the photographs is included *Subject Headings:* **1. Earth photography from outer atmosphere 2. Cloud photographs from satellites 3. U. S. satellite 1960 Beta (TIROS I) 4. Satellite photographs.**—*A.J.M.* Ⓢ

12I–144 523.4:551.510.5:551.507.362

King, Jean I. F. (*Missile and Space Vehicle Dept., Genl. Elec. Co.*), **Deduction of vertical thermal structure of a planetary atmosphere from a satellite.** *Planetary and Space Science*, New York 7:423–426, July **1961.** 4 figs., table, 6 refs., 6 eqs. **DWB, DLC**—An inversion technique is developed for deducing the temperature stratification of a planetary atmosphere from the variation of the emission spectrum with air mass. This is a planetary application of the well-known solar limb-darkening effect. Mathematically, the emergent intensity is an integral transform of the Planckian temperature taken as a function of optical depth. The solution therefore consists in devising a scheme for inverting the transform. Pending satellite observations, the following approach is used for the verification of the theory. Ground observations of the emission of the 9.6μ ozone band as a function of air mass thickness have been taken. These radiative data provide information on ozone "at a distance," in a manner similar to the remote satellite viewing from above. Four sets of ozone emission data have been analyzed and the vertical thermal structure of the ozonosphere deduced therefrom. A critique of the method together with future research directions is given. *Subject Headings:* **1. Planetary atmospheres 2. Planetary temperatures 3. Ozonosphere temperature measurement techniques.**—*Author's abstract.* Ⓢ

12I–145 523.4:551.4:550.

Lomnitz, C. (*Inst. de Geofísica y Sismología, Univ. of Chile, Santiago*), **On thermodynamics planets.** *Geophysical Journal*, London, 5(2):157–161, July **1961.** 5 refs., 33 eqs. **DWB, DLC** A thermodynamic theory of planets is outlined. General results by Prigogine, de Groot and others are applied to the case of a steady-state system with a constant temperature distribution. A "excited state" is defined by pressure perturbation introduced by an earthquake at the surface the planet. The resulting transient flows towards the perturbed region are analysed, and it is shown that the energy transient is logarithmic in time. A condition of realizability of the earthquake problem is defined. For a given planet type there is a critical size below which no seismic activity can occur on the planet. *Subject Headings:* **1. Thermodynamics of planets 2. Seismic processes on planets 3. Planetary seismicity.**—*Author's abstract.* Ⓢ

12I–146 523.4:535.

†Dollfus, Audouin (*Paris, Meudon Obs.*), **Polarization studies of planets.** (In: Kuiper, G. and Middlehurst, B. M. (*eds.*), **Planets and satellites.** Chicago, Univ. of Chic. Press, **1961.** p. 343–399. 51 figs., 64 refs., 6 eqs.) **DWB, DLC**—In a short introductory section the author defines some pertinent terms including angle and plane of vision and degree of polarization. Following this is a section on measuring devices including discussion of Lyot's visual polarimeter, visual polarimeter for faint sources, sky-light compensators, etc. The next topic is laboratory measurements—a discussions of experiments on various materials (vitreous materials, opaque powdered materials, igneous rocks, volcanic ash, etc.) in order to determine their polarization characteristics. The last section in this article covers polarization of the Moon and planets. The characteristic polarization of each of the planets is discussed in detail including atmospheric phenomena (clouds, various markings, etc.) and interpretation of observations. A number of graphs are included and a good bibliography is given at the end of the article. *Subject Headings:* **1. Polarization of planets 2. Planetary atmospheres.**—*A.J.M.* Ⓢ

12I–147 523.4:551.524

†Pettit, Edison (*Mt. Wilson and Palomar Obs.*), **Planetary temperature measurements.** (In: per, G. P. and Middlehurst, B. M. (*eds.*), **Planets and satellites.** Chicago, Univ. of Chic. Press, l. p. 400–428. 7 figs., 5 tables, 25 refs., 36 eqs.) **DWB, DLC**—After a brief historical outline adiation measurements the author discusses the following topics: vacuum thermocouples and mocouple measurement, radiometric magnitudes, energy calibration, isolation and measurement lanetary heat, corrections for variable atmospheric water vapor, and equations relating planetary perature and radiation. In the remaining sections the temperature characteristics of the Moon, rcury, Mars, Venus, Jupiter and Saturn are discussed in some detail. Included in this discussion surface composition, possible atmospheric effects, and the temperature observed for each planet. uations, graphs and tables illustrate the text. *Subject Heading:* **1. Planetary temperatures.** *A.J.M.* Ⓢ

12I–148 523.4:551.521:551.508.21

Sinton, William M. (*Lowell Obs.*), **Recent radiometric studies of the planets and the Moon.** : Kuiper, G. P. and Middlehurst, B. M. (*eds.*), **Planets and satellites.** Chicago, Univ. of Chic. ss, 1961. p. 429–441. 7 figs., table, 19 refs., 5 eqs.) **DWB, DLC**—A brief introductory section usses the general methods and techniques of radiometric observation. Following this are sections Venus, Mars, and the Moon in which the results of radiometric observations of these bodies are sented. Temperature, spectra of observation, atmospheric elements found, atmospheric phe- nena observed, etc. are some of the specific topics covered. *Subject Headings:* **1. Planetary iation 2. Radiometry of planets.**—*A.J.M.* Ⓢ

12I–149 523.164

†Mayer, Cornell H. (*USN Res. Lab., Wash., D. C.*), **Radio emission of the Moon and planets.** : Kuiper, G. P. and Middlehurst, B. M. (*eds.*), **Planets and satellites.** Chicago, Univ. of Chic. ss, 1961. p. 442–472. 4 figs., 4 tables, 91 refs., 5 eqs.) **DWB, DLC**—This article begins with a eral discussion of the nature of planetary radio emission and the uses of observational radiometric a, including information about the planet derived therefrom. In the sections which follow the hor presents observational results on the Moon, Venus, Mars, Jupiter and Saturn. From these ults the author moves to a discussion of individual planetary characteristics as indicated by the a, source of emission, atmospheric effects (of the emitting planet) on the radiation, etc. As might expected, the discussion is most comprehensive concerning the Moon, Jupiter and Venus. Tables l graphs are given for these three bodies. A good bibliography is given at the end of the article. *bject Headings:* **1. Radio emission from planets 2. Radio emission from Moon.**—*A.J.M.* Ⓢ

PART III. TRANSLATIONS AND ANALYTICS FROM SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted.

A. TRANSLATIONS

Soviet Astronomy AJ, New York, Vol. 4, No. 6, May/June 1961 (Transl. of original Russia journal, **Astronomicheskiĭ Zhurnal,** Moscow, Vol. 37, No. 6, Nov./Dec. 1960)

Shklovskiĭ, I. S.: **Radio galaxies,** p. 885–896
Vitkevich, V. V.: **Radio astronomical observations of moving plasma clouds in the solar supe corona,** p. 897–903
Salomonovich, A. E.: **Localization of solar radio bursts on a wavelength of 8 mm,** p. 904–90
Kuz'min, A. D.; Levchenko, M. T.; Noskova, R. I. and Salomonovich, A. E.: **Observations discrete radio sources on 9.6 cm,** p. 909–912
Gintsburg, M. A.: **Generation of plasma waves by solar corpuscular streams,** p. 913–916
Stankevich, K. S.: **Monochromatic radio emission of interstellar molecular hydrogen ion** p. 917–922
Ikhsanov, R. N.: **On the nature of Cyg X,** p. 923–928
Obridko, V. N.: **Excitation of the Ca II K line in the solar chromosphere,** p. 961–964
Polupan, P. N.: **Spectrophotometry of the chromospheric limb flare of October 11, 195** p. 965–975
Lipskiĭ, Iu. N.: **Photography of the reverse side of the Moon—techniques and preliminar results,** p. 976–989
Radlova, L. N.: **Color of the bright rays on the lunar surface,** p. 990–992
Shteĭns, K. A. and Riekstyn'sh, E. Ia.: **On the diffusion of comets, Pt. 1,** p. 998–1004
Sitnik, G. F.: **Blackbody model operable at high temperature,** p. 1013–1022
Liigant, M. and Eĭnasto, Ia: **Theory of automatic satellite tracking telescopes,** p. 1023–1031
Ioffe, S. B. and Drichko, N. M.: **Birefringent filter for astrophysical studies of the Sun in the line of ionized calcium,** p. 1032–1036
Kunitskiĭ, R. V.: **Simultaneous determination of latitude and longitude from absolute measur ments of the altitudes of two stars,** p. 1046–1052
Vitkevich, V.: **News on radio astronomy research in the U. S. A.,** p. 1064–1075
Report on the work of the editors of Astronomical Journal to the Division of Physical an Mathematical Sciences of the USSR Academy of Sciences, p. 1076–1078

B. ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Akademiia Nauk SSSR. Astronomicheskiĭ Sovet, Biulleten' Stantsiĭ Opticheskogo Nabli deniia Iskusstvennykh Sputnikov Zemli, No. 3, 1958

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